MARCH 15, 1954

NEWS ISSUE

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION

The Helicopter:

Hydro-Electric Power Commission of Ontario uses it to sound the depths of the St. Lawrence
Page 16

Los Angeles Department of Water and Power uses it to string a 138-kv line
Page 20

ANN ARBOR MICH
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UNIVERSITY MICROFILMS
E & POWER

EFFECT OF TRANSMISSION LOSS calculations on AG&E system is discussed by D. K. Blake, Mgr. Transmission Engr. and S. B. Crary, Mgr. Analytical Engr.

NEW "PENALTY FACTOR COMPUTER" EXPECTED TO SAVE $100,000 PER YEAR ON INTERCONNECTED SYSTEM

Brings Top System Efficiency by Co-ordinating Transmission Losses with Plant Performance, Fuel Costs

Developed after two and one-half years of research by General Electric working with American Gas & Electric Service Corp., a new "penalty factor computer" will make optimum system operating economy a reality. It permits the load dispatcher to take into account the many constantly and rapidly fluctuating conditions on the lines as well as in the stations.

The electronic computer brings transmission losses into the load scheduling picture, permitting almost instantaneous calculation of the most efficient generation scheduling. Resulting savings of $100,000 per year are expected by A.G.&E.

OPTIMUM SYSTEM ECONOMY will be approached when this incremental fuel cost slide rule at A.G. & E.'s System Production Co-ordinating Group Office in Columbus, Ohio, is teamed with new computer.

Applicable to Other Systems

The "penalty factor computer" eliminates the current practice of approximating the corrections for adverse effects of transmission losses. It supplements the incremental fuel cost slide rule now used to allocate generation facilities under varying conditions of load and capacity. And it permits the load dispatcher to quickly order changes at far-away generating stations after rapid calculation of line losses.

Although originally developed to obtain top economy on the A.G.&E. system, the new computer will be applicable to other systems.

Increased Need for Co-ordination

It meets the increasing need for proper co-ordination of incremental fuel costs and transmission losses caused by:

1. Economic factors and availability of fuel, water, etc., that necessitate location of generating plants at greater distances from load centers.
2. Installation of larger blocks of power which often results in necessity of transmitting power out of a given area until load in that area equals newly installed capacity.
3. Interconnection of power systems for purposes of economical interchange and reduction of reserve capacity.

For more details on the new "penalty factor computer," write for GET-2415. General Electric Co., Schenectady 5, N. Y. 301-245

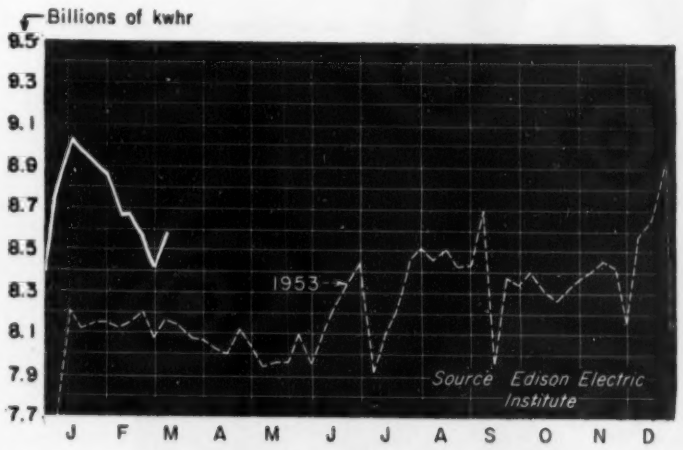
MORE POWER TO AMERICA

GENERAL ELECTRIC

VOLUME 141, NO. 11

March 15, 1954

Electrical World



Output Week Ended Mar. 6—8,586,000,000 Kwhr

Seasonally Adjusted Index†—161.0

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Mar. 6	+5.1	+0.9	+1.0	−3.4	+10.0	+20.6	+8.9	+4.9	+5.8	+0.9
Feb. 27	+4.0	+2.0	+0.8	−2.0	+7.5	+15.5	+9.0	+2.8	+7.2	−3.5
Feb. 20	+4.3	+3.7	+1.0	−2.9	+5.6	+15.0	+9.5	+2.5	+9.8	+1.8

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Dec.	81.2	78.1	75.5
Capacity (Million Kw)	Dec.	91.49	89.81	82.05
Production (Billion Kwhr)	Dec.	39.06	36.38	36.45
Hydro	Dec.	8.67	6.91	8.22
Fuel	Dec.	30.39	29.47	28.23
Fuel Consumption				
Coal (Million Tons)	Dec.	10.87	10.17	10.75
Oil (Million Barrels)	Dec.	7.62	6.91	8.60
Gas (Billion Cu Ft)	Dec.	70.78	81.13	59.81
Sales (Billion Kwhr)	Nov.	31.59	32.21	30.08
Residential	Nov.	9.02	8.70	8.16
Commercial	Nov.	5.50	5.62	5.01
Industrial	Nov.	14.95	15.56	14.91
Other	Nov.	2.12	2.33	2.01
Net Income Class A & B Companies ($ Million)	Nov.	84.26	76.19	80.63
Estimated Dec. '54 Peak (Million Kw)	Dec.	94.0	94.7	96.0
Kwhr per Residential Customer (12 Month Average)	Dec.	2,345	2,331	2,169
Revenue per Kwhr Residential Service (12 Month Average)	Dec.	2.74¢	2.75¢	2.77¢
Canadian Production (Billion Kwhr)	4th Qtr	363.5	369.5**	361.1

Business Statistics

FRB Industrial Production Index†	Jan.	124	125	132
Gross National Product Annual Rate ($ Billion)	Dec.	5.72	5.45	5.54
EW 4 Industry Production Index†	Jan.	118.5	120.4	125.3
ENR Construction Cost Index††	Feb.	128.9	128.7	123.1
BLS Consumer's Price Index	Dec.	114.9	115.0	114.1
NEMA Insulation Materials Sales Index†	Dec.	133	130	176
NEMA Electric Appliance Sales Index†	Dec.	69	70	105
NEMA Household Refrig. Sales Index†	Dec.	53	35	75

*Preliminary **Revised †1947-49=100 ††1949=100

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This is probably the largest and strongest strain insulator ever made. It is one of an order for 50 such units to be installed in guys for a giant transmitter antenna. Weighing 1340 lbs., it is to be used with a 2¼" steel strand cable, and is designed to break the cable before failure of the insulator—frame or porcelain.

Most of the world's vertical radiators for radio transmission are insulated by Lapp units—both footing and guy insulators . . . which Lapp originated and have produced in considerable volume for nearly 25 years. All have incorporated the Lapp porcelain "compression cone," a design which utilizes to fullest extent the enormous strength of porcelain in compression. When properly mounted, Lapp porcelain attains a compression strength in excess of 100,000 lbs. per square inch.

But basic to such strengths is "proper mounting." In Lapp radio insulators, proper mounting means external attachment of hardware, a design conception which provides that thermal changes between parts, as well as external loading, load the porcelain in compression.

External attachment of hardware, you'll notice, is also the design conception of the Lapp Line Post and Station Post, and a reason why these insulators so greatly outperform multi-part internally-attached-pin insulators.

This is one of the things we mean when we say that Lapp has an understanding of porcelain, its virtues and its strengths as well as its limitations . . . and an ability to design and produce assemblies that assure greater operating security, longer life, lower upkeep.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

THE ELECTRICAL WEEK

The Issue's News Highlights . . . General Electric is investigating the cause of a freak failure which resulted in the bursting of a rotor during tests.

Atomic Energy Commission unveils a five-year program for industrial atomic power development . . . New York State Power Authority's new chairman is Robert Moses.

Kentucky Utilities and East Kentucky Rural Electric Cooperative agree to integrate their systems.

REA representatives headed by Ancher Nelson met in Chicago with electrical manufacturers' representatives and Col H. S. Bennion and Harold Beatty of EEI. Purpose, REA said, was to give a better picture of the rural market for electrical equipment and appliances.

A major break appeared in the ranks of the independent United Electrical Workers Union: Local 301, representing 20,000 production workers at General Electric's Schenectady, N. Y., plant, indicated it would secede and join UE's arch rival, the IUE-CIO, headed by James Carey. The local, beside being the union's largest, is regarded as its hard-core leftist unit. In return for being accepted by Carey's union, Leo Jandreau was reported to have pledged himself to follow the anti-communist doctrine of the CIO union.

Proxy solicitation of Puget Sound P&L stockholders will begin March 27 as the result of a final decree handed down by a Massachusetts Superior Court. The order amplified an earlier one giving authority to a stockholders committee favoring merger with Washington Water Power Co to obtain a complete list of Puget shareholders on or before March 15. Puget's annual meeting, the court said, must be held not less than 90 days and not more than 150 days from the date (March 9) of the order.

A private company, Ohio-Midland L&P, received a $3 million REA loan to finance building of 102 miles of distribution line and other facilities to serve 1,798 additional rural consumers. The loan will also help the company meet increased power needs in the Canal-Winchester area.

Common Pleas Court in Pittsburgh is hearing an injunction suit brought by Duquesne Light Co against Upper St. Clair township officials. The township is attempting to halt construction of a transmission line between Elrama and Woodville—latest in a series of obstacles placed before the utility in its attempts to secure rights-of-way. The state's PUC has granted a certificate of necessity for the line.

California Electric Power Co, entering its 50th anniversary year, led the nation's private utilities in percentage of customer growth—45%—in the last five years, according to Carl C. Ernst, vice president.

Off the Washington Wire . . . New cost allocation formula for federal multipurpose hydro projects is on the verge of acceptance by all agencies concerned: Department of Interior and Corps of Engineers, Budget Bureau and Federal Power Commission. As a result, it's certain that higher cost allocations to the power part of the projects mean that higher power rates will have to be charged.

Interior gave Georgia co-ops 30 more days in which to file their views on the proposal to have Georgia Power wheel energy to them as preference customers. Ex-Gov Ellis Arnall, counsel for Georgia Electric Membership Corp, had requested a 60-day extension beyond the March 19 deadline.

President Eisenhower has agreed to meet March 16 with a Tennessee Valley delegation which will urge reappointment of Gordon Clapp as TVA Board chairman. Republican Sen John S. Cooper of Kentucky, who arranged the meeting, is insistent that political considerations not enter into TVA appointments . . . An interesting sidelight: In the evenly divided Senate Public Works Committee, where the TVA appointment will have to be cleared, Independent Wayne Morse holds the deciding vote. He will try to block appointment of anyone who might weaken TVA. (See related story on page 15).

Interior awarded a $2.6-million high line tower contract to American Bridge division of U. S. Steel even though an Italian firm had made a bid more than 25% lower. Department officials said the Italian designs were "deficient" from an engineering standpoint.

Senate Judiciary Committee has launched a preliminary study of alleged purchases of Puget Sound P&L stock by Washington Water Power Co.

Connecticut Light & Power Co is seriously studying the possibility of a nuclear power reactor in its future system expansion, a Congressional source reported.

Ellensburg (Wash.) City Light linemen were granted a 4% wage increase to $2.70 an hour, retroactive to Jan. 1. They are members of IBEW-AFL . . . Lynn (Mass.) G&E's 525 employees have received a 5¢-an-hour wage increase.

Executive Changes . . . Dwight Douglass, assistant vice president of Hartford Electric Light and Connecticut Power was elected a vice president of the latter utility. He succeeds Vice Pres Fred D. Knight, who has retired after 13 years' service with both companies. Raymond A. Gibson, vice president of Hartford Electric Light, was named executive vice president of that utility, and General Counsel H. B. Carey, Jr, was appointed a vice president . . . A. H. Bruning, former director of industrial development for Florida Power Corp, was made a vice president of Georgia P&L.

Rotor failure wrecked balancing pit at turbine plant

GE Probing Freak Mishap

Intensive investigation is under way to discover what caused the 41-ton rotor of a 100,000-kw generator to burst during balance tests at the General Electric Co plant in Schenectady, N. Y.

The freak failure at 1 a. m. March 4, scattered rotor fragments over a wide area and did considerable damage to a portion of the test area and the building. A test engineer was killed. Twenty-three other workers in the area were treated for minor injuries and sent home within a few hours.

Cause Unknown . . . "We do not know what caused this serious failure," W. E. Saupe, general manager, large steam turbine generator department, said. "It may be some time before the cause is established. But we are confident that the investigation will show that this failure was due to unique properties or configurations of this specific rotor and will not cast any doubts as to the safety of other rotors on similar machines either in service or under construction."

The rotor involved was a standard alloy-steel forging approximately 15 ft long and 39 in. in diameter weighing 83,000 lb. It was for a 100,000-kw, 3,600-rpm AIEE-ASME preferred-standard generator and was in the second day of tests at the time of the failure.

There was nothing unusual about the test being conducted at the time. It was the routine balance given all generator rotors in the precision balance pit.

The rotor had been brought up to 3,300 rpm in a succession of steps but had not yet reached normal operating speed when the failure occurred.

The body portion of the rotor burst suddenly. The retaining rings did not fail. The bursting force was such that one chunk of the rotor body, weighing 1,500 lb, was hurled through the roof of the turbine building. It traveled an estimated 900 ft before dropping back through the roof again at the front of the building. It angled through the fourth floor of the office portion of the building, ripped off part of the stainless steel facing and landed in the street.

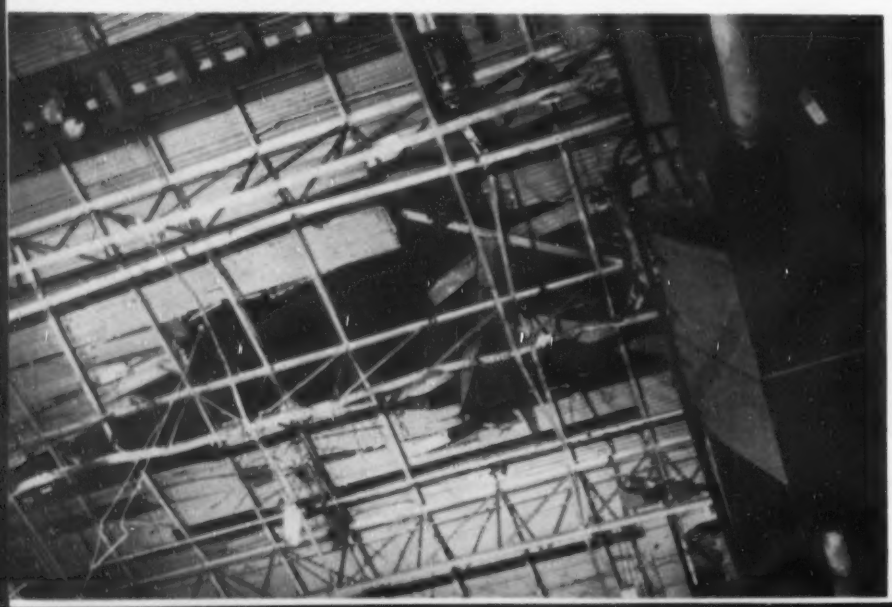
The Damage . . . Considerable damage was done to the balance pit. However, the driving test turbine was not damaged. Saupe reports that it will be several weeks before this test facility can be repaired. In the meantime precision balancing of generating rotors is being carried on with other facilities. In all, an estimated 5% of the turbine plant was affected.

Normal production was resumed after a partial shut down in the area to repair damage. This period was limited to four days by round-the-clock repair activities of company maintenance groups.

A complete investigation has been launched to determine the cause of the rotor failure which is the first in General Electric's 50-year history of building and testing thousands of generators.

All experts, including GE's Research Laboratory and the Materials and Processes Laboratory, are participating in the investigation. Personnel of the entire company have been mobilized where contributions to this investigation can be made.

Flying fragments of rotor ripped hole in building's roof



5-Year Atom Power Program . . .

. . . outlined by Atomic Energy Commission. Plan includes four new reactors and small plant for Army post

It has always been a safe bet that economic industrial power won't be pried out of the atom for another decade. Atomic Energy Commission moved this week to shorten the odds on that kind of bet by announcing a fast-paced, five-year program aimed at developing reasonably priced power from nuclear fuel.

In its biggest foray yet in the civilian power field, the government agency unveiled plans for building four new power reactors—one or two of which hold the promise of turning out commercially feasible electric power. These are in addition to the utility-size nuclear power plant already on the boards at Westinghouse Electric Corp. (EW, Nov. 2, '53 p 74).

At the same time AEC indicated it is about ready to award a lump-sum contract for a small nuclear power plant suitable for furnishing electricity at an Army post. This joint AEC-Army venture will be a small, package plant which might possibly be moved from time to time. But since this reactor will be keyed to military use, costs will not be a prime factor.

A Big Shift . . . All this activity in the civilian power field marks a significant policy shift for AEC which has in the past devoted almost all its time to production of bombs and weapons. It was only last year that the agency announced plans for its first large-scale reactor suitable for producing industrial power, and that one is not calculated to produce power at competitive rates.

The program is essentially what many atomic scientists have been urging for years. AEC will build a number of different reactors, studying the characteristics and costs of each.

It may be that none of the five will turn out to be ideal or economically competitive for industrial power production. But AEC technicians believe that sufficient reactor technology will be developed to justify the program.

Congressional Mandate . . . The program was developed and written at the direction of Congress. Joint Congressional Committee on Atomic Energy is now considering legislation to encourage industrial development of atomic power and requested the program in that connection.

It will take some weighing by industry to tell whether the government program will encourage or discourage private research in the nuclear power field. This is especially true if the government intends to undertake the same type of reactor which an industry group may have its eye on.

There is another crucial reason for the AEC's reactor program. Foreign nations which supply a sizable portion of the raw materials for the U. S. atomic program desperately need new sources of power. They look to the U. S. to share some of its nuclear power technology with them.

Belgium, for instance, has threatened to choke off U. S. supplies of uranium from Belgian Congo deposits unless it gets reactor information.

As disclosed in a speech last week by AEC Commissioner Henry D. Smyth, the five year development program has these features:

- Construction and operation of a 60,000-kw pressurized water reactor at cost of some $45 million. Because of the high capital cost, this one will not produce competitive commercial power. It is already on the drawing boards at Westinghouse and is scheduled for completion within four years.
- Construction and operation of a breeder reactor of intermediate size. Electrical capacity of this one will be about 15,000 kw and liquid sodium will be used to carry the reactor heat to a heat exchanger to transfer to a turbine. This is not expected to be competitive with other energy sources.
- Construction and operation of a boiling water reactor with a power capacity of 5,000 kw. Economics of this one are not sufficiently known to hazard a guess on costs.
- Construction and operation of a homogeneous reactor—a scale-up of an experimental model now in operation at Oak Ridge National Laboratories. Again the economics are little known, but this is considered by some to be more economical. Initially there won't be a generator installed.
- Construction and operation of a sodium-potassium, graphite high-temperature reactor with a heat capacity of some 20,000 kw. Again the economics are dim.

Of these, Congress has appropriated money for only one—the pressurized water reactor being designed and constructed by Westinghouse.

How AEC's Reactor Program Stacks Up

Reactor designation	Electrical capacity (kw)	Heat capacity (kw)	Cost (million dollars)	Coolant	Moderator	Competitive with other sources?
Pressurized water	60,000	240,000	45	water	water	no
Breeder intermediate	15,000	62,500	?	sodium	none	no
Boiling water	5,000	20,000	?	water	water	?
Homogeneous	——	3,000	?	aqueous solution	aqueous solution	?
Graphite-sodium-potassium	——	20,000	?	sodium-potassium alloy	graphite	?

On Other Atom Fronts . . .

- Great Britain's Works Minister Sir David Eccles told the House of Commons that the government will build "a big, fast reactor of the breeder type" in northern Scotland to power homes and factories.
- AEC announced American air bases in the Arctic, such as Alaska and Greenland, may be equipped with air-transported "package" atomic power plants to provide electricity and that private firms were being canvassed to determine if any would be willing to build such a plant.
- TVA General Manager John Oliver hinted that AEC may further expand its facilities in the valley because of "indication of defense load requirements not identified last fall" when President Eisenhower urged that private companies take over job of furnishing power for new AEC plant at Paducah, Ky. Oliver indicated new AEC facilities will need TVA power released from Paducah.

Moses Gets Post . . .

. . . as chairman of New York's Power Authority and will fight for development of Niagara

New York City's hard-hitting Robert Moses was named chairman of the State Power Authority of New York by Gov Thomas E. Dewey last week. The move came several days before the opening of Senate hearings on various bills providing for development of an additional 1.1 million kw at Niagara Falls and Moses will lead the fight for state development.

Moses, who holds seven city and state jobs and is considered an expert in public construction projects, replaces John E. Burton as chairman of the power authority. Burton will remain as a member of the authority. He had asked to be relieved of the chairman's duties on Feb. 20 because he said they interfered with his work as vice president of Cornell University in charge of its business operations.

Bell Resigns . . . To make these changes possible, Elliott V. Bell, publisher of Business Week and executive vice president of McGraw-Hill Publishing Co, resigned as a member of the authority. The resignation became effective Feb. 26. On that date Bell wrote Governor Dewey that he did not want to be reappointed to the authority. His term was due to expire May 1. Bell explained that because the authority expects to start construction this year on the St. Lawrence hydroelectric project, the authority would be better served by someone more experienced in large-scale public works projects and someone who could devote more time to affairs of the authority than he.

In announcing the appointment of Moses, Governor Dewey noted that Moses, as Secretary of State under Gov Alfred E. Smith, had played a major part in formulating state policy on development of publicly owned hydro sites 30 years ago.

Other Members . . . The other members of the power authority are Edward Case, Wyman S. Bascom, and Hickman Powell.

Both Moses and Burton were scheduled to appear before the Senate Public Works Committee last week to testify in behalf of the Ives-Becker (state development) bill. Committee also is considering the Capehart-Miller (private development) bill, and the Lehman-Roosevelt bill.

New Chairman—ROBERT MOSES

Lesser Role—JOHN BURTON

Resigned—ELLIOTT BELL

'No Sale,' but . . .

. . . Administration would dispose of some federal projects to public bodies, Tudor says

The Eisenhower Administration would sell some federal power facilities to "responsible" public bodies in certain instances, according to Ralph A. Tudor, Undersecretary of the Interior. Speaking before the Municipal Forum of New York City this month, he stated there exists one exception to the Interior's general "no sale" rule on multipurpose projects:

". . . if some responsible public body, such as a state, comes in with a concrete proposal to purchase some of our facilities, such a proposal will be approached by us with an open mind."

Several Possibilities . . . Among such possible sales that Tudor cited were the Central Valley Project in California and certain feeder transmission lines within Arizona. He emphasized that both cases were unusual in that all properties involved were entirely within the boundaries of the states concerned.

In any case, the undersecretary said, "We will not consider any proposal which fails to provide the federal government with as many dollars by purchase and sale as it would if ownership is retained."

No New Starts . . . Turning to the subject of new federal projects Tudor stated the department does not propose to recommend the construction by the federal government of new generating or transmission facilities which can be provided by either public or private local interests.

He added that the department favors working with local interests on certain projects. The best of several proposals made so far, he said, was that local interests provide all of the money to finance power costs, while the government provides money for irrigation, flood control and navigation.

Long range aim of this "partnership," Tudor asserted, is to provide as many kilowatts as possible for the country.

"Today we only have a narrow national surplus of about 6% and that is not enough. If we had one adverse water year, we'd be in trouble."

R. M. WATT, KU president, signs integration agreement as Alex Veech, co-op president, seated, and Robert Coleman, Kentucky Public Service Commission chairman, look on

KU-Co-op Sign Integration Pact

Kentucky Utilities Co and East Kentucky Rural Electric Cooperative Corp have called off a 13-year feud with the signing of an agreement to interconnect and integrate their generating and transmission systems. At the same time, Kentucky Utilities and the state's cooperatives have agreed to join forces in a still unnamed organization for the purpose of working "toward the further social and economic improvement of the rural areas of the state."

Under the interconnection agreement, signed by KU Pres R. M. Watt and co-op Pres Alex Veech, the utility will continue to serve load centers of East Kentucky's member cooperatives until new co-op generating units are in operation. KU will provide the co-op's power requirements in excess of 40,000 kw in the area covered by the agreement until other units are installed by the East Kentucky cooperative.

In Operat'on Soon . . . The cooperative, which received authority to erect a plant on the Kentucky River in Clark County after a long fight with KU, announced that the first of its 20,000-kw generating units will be completed about May 1 and the second unit, with a similar capacity, by June 1.

The cooperative also proposes to acquire approximately 135 miles of transmission lines from its member co-ops and to complete construction of about 840 additional miles of line during 1954 and 1955. KU proposes to add 207 miles of lines over the same span to interconnect with the cooperative. KU and East Kentucky also agreed to consult with each other in connection with additional facilities required to serve loads in areas where both are interested.

Long-Range Union . . . The agreement, initially for a period of ten years, may be continued thereafter unless terminated by a three-year notice from either party. In approving it, Robert M. Coleman, Public Service Commission chairman, said the contract "is the first of its kind in the U. S.," and "establishes a pattern for better relations between rural electric corporations and electric companies throughout the country."

In a joint statement, Watt and Veech agreed it would be "to the best interests of East Kentucky and its member cooperatives, of Kentucky Utilities Co, of the farmer, and of the public at large."

The joint co-op-KU development committee will be headed by Roy York, manager of Fox Creek Cooperative, Lawrenceburg. E. R. Murphy, KU farm service director, is secretary of the organization, which will work with all other groups interested in similar objectives.

Co-op Asks Court Uphold SPA Contract on Lines

Suit by Central Electric Power Cooperative, Linn, Mo., to force the government to live up to power contracts entered into during the Democratic Administration may be nearing a showdown this week. Federal District Court Judge Edward M. Curran, who is hearing the arguments in Washington, now is preparing to rule on a motion by the co-op for summary judgment.

If granted, government attorneys would be forced to appeal or accept defeat. Judge Curran last week denied government motions to dismiss the suit or for summary judgment. The outcome of the case will have a bearing on similar contracts which Southwestern Power Administration made with four other Missouri and Oklahoma power co-ops (EW, Nov. 9 '53, p 9).

Central Electric—like the other co-ops—had built or was building transmission lines for use by SPA under contracts signed in 1950. Then Congress that same year adopted a committee report cutting off SPA money for carrying out the contracts and, later, Republican Secretary of Interior Douglas McKay directed the power marketing agency to withdraw from the contracts. The legality of these actions is what Central Electric is challenging now.

IN THE INDUSTRY

U-50 Change May Cause Tilt in Congress

A fight may be looming in Congress over the Securities and Exchange Commission's proposal to modify the competitive bidding Rule U-50 for companies under the Public Utility Holding Co Act of 1935 (EW, March 1, p 63).

SEC is proposing an amendment to the rule which will exempt from competitive bidding subsidiaries of holding companies whose securities are subject to regulation in the state in which the issuer is incorporated or is conducting various service operations.

Heller Protests . . . Rep Louis B. Heller (D-N. Y.) is the latest to challenge SEC's present plans. He said that if the change is adopted it would undermine a very significant reform that has taken many years of hard work and effort to achieve.

Earlier, Sen Henry M. Jackson (D-Wash.) had challenged the rule change as altering radically existing practices. He felt that "every member of Congress shares my view that any party proposing to eliminate competition in an area so vital to our welfare has the burden of showing why it is in the public interest to do so."

Long Step Backward . . . Addressing the House of Representatives on March 3, Rep Heller said:

"If adopted . . . this country will have taken a long step backward in the direction of the loose financial and ethical practices which prevailed in the business and financial community during the roaring 1920's. These sharp practices undermined the integrity of our capital markets, destroyed investor confidence, and led business and industry to the brink of national disaster."

Speaking on changes in the rule, Rep Heller declared: "If the giant utilities and financial institutions who have been subject to this rule . . . have not complained about it, why propose a change? Is this another payoff by the Eisenhower Administration to super big business?"

He continued: "Advocates of the proposed changes in the rule—chiefly investment bankers and utility executives—will say: 'We are not trying to destroy competitive bidding. We merely want to turn this matter over to the regulatory commissions. It is a matter of states rights . . .' Oh! How these giant utilities and big bankers love the iron hand of state regulation.

"Mr. Speaker," he went on, "let us not cave in to these pressures at this crucial time. Let us not permit the SEC to fell with one swoop a key reform of the Roosevelt Administration, a reform which both friend and foe will admit has worked exceedingly well in eradicating one of the great evils that beset utility financing before that era of federal public utility regulations."

The New York representative has estimated that 124 utility subsidiaries whose companies are registered under the act will be affected. He thought that half of the debt financing subject to the act would be exempted. He further pointed out that in the fiscal year 1953 the volume of debt financing subject to the existing rule was $394 million.

A Congressional investigation has already been threatened by Rep Heller if the SEC puts the proposal into effect.

Young in Fight . . . Another dissenter, Robert R. Young, who is fighting to obtain control of the New York Central Railroad, told the SEC recently that the proposed change came "from someone in the Administration."

On the other hand, SEC's Chairman Ralph H. Demmler has said that the plan "was developed wholly within the commission and in consultation with its staff without any suggestion from anyone outside the commission and without the prior knowledge of anyone outside the commission."

All proponents and opponents have until March 15 to submit briefs. SEC will hold additional hearings on March 31 and after that it will take the matter under consideration.

In the meantime the power companies which will probably have a record year in the raising of new capital to take care of the estimated $2.9 billion construction program to be spent in 1954 are interested in the final outcome.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Low battery voltage has disastrous effect on protective relay operation. Faulty contacts in the dc line are as critical as battery condition and more difficult to detect.

Few linemen can take without great pain more than 11 volts of shock when they make a thoroughly wet grip contact.

Refraction of radio waves at certain critical temperature and humidity gradients practically compensates for curvature of the earth—a happy circumstance for reception.

Neutral compensator in the primary relay circuits of Y-connected self-controlled regulators can provide considerable improvement in feedpoint voltages.

Benson boiler of 276,000 lb per hr has been working since November 1951 at Leverkusen-Bayerwerk at 2,280 psi and 1,130 F. Feifel cyclone separates the flyash and returns it to the combustion chamber.

Grounding of street light fixtures to telephone messengers is sanctioned in some areas.

Fungus growth in cable dielectric is suspected of being fostered by dc potential.

Fatigue limit of three-quarter hard aluminum approaches that of copper. Assuming no severe local stress concentration, high frequency vibrations should cause no more trouble than experienced with copper.

Simplicity of American practice in metering kilovars along with obliviousness to kva seems to astonish most Europeans.

Boiler controls should be designed with the boiler rather than improvised as an afterthought.

Micro-organisms show no favoritism. Control cable also is subject to attack, should be power-factor tested to detect their inroads.

Locomotives utilizing the electric drive may be powered by diesel engines, steam turbines, gas turbines, or by overhead trolley systems fed from large utility plants.

for your substation switching requirements...

CHANCE Type H

High Pressure–Group Operated–Rotating Stack Switches

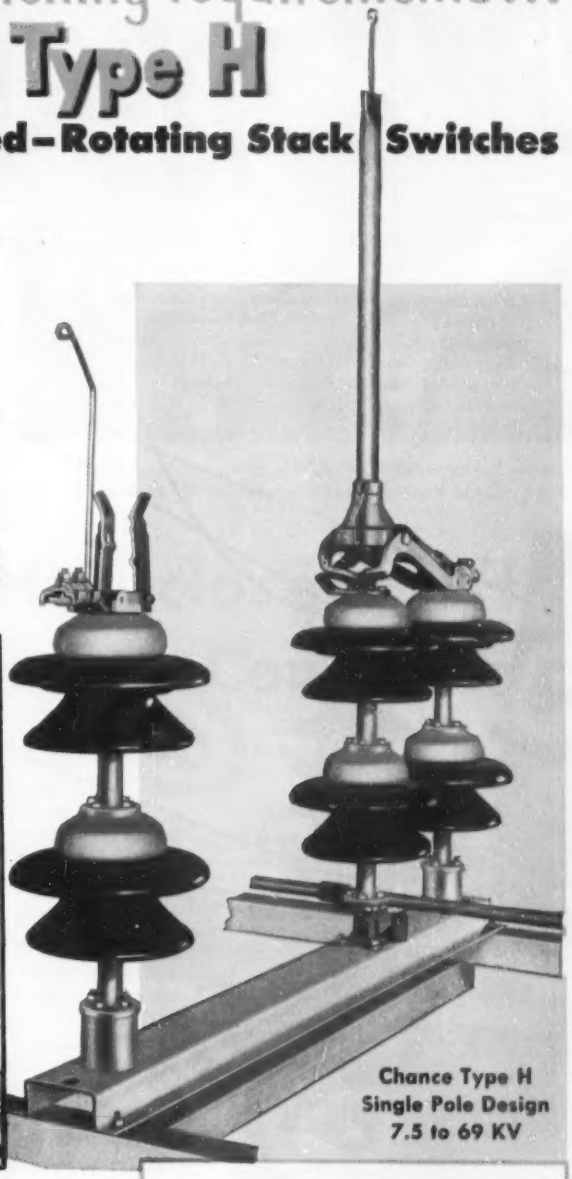
7.5 through 230 KV.—400—600—1200 Amps

Chance Type H Outdoor Group Operated Airbreak Switches have only three moving parts. This means years of dependable service in any kind of weather—without maintenance or attention. These switches have sufficient leverage to break heavy ice accumulations with ease.

Both the hinge and clip end of the switch are equipped with constant high pressure contacts. The hinge connection is completely enclosed and maintains high pressure at all positions. The blades close with a rotating wiping motion that makes a clean, high pressure, copper to silver contact. Ribs on the contact clips hold the blade firmly under extreme short circuits or surges.

Here's why Type H is easy to install on any type of structure

This universal control crank has screw point recesses at 10° intervals. Controls can be adjusted within 5° of any position... the control mechanism can be readily adapted to any type of structure.



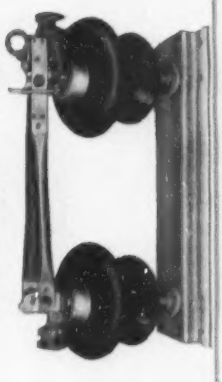
Chance Type H Single Pole Design 7.5 to 69 KV

The versatile Chance Type H Switch has all the features necessary for dependable switching operations on today's heavily loaded systems. Type H is manufactured in voltage ratings from 7.5 through 230 KV—400 to 1200 amperes.

Look to Chance for your substation switching needs. Write for complete information and prices.

HOOK STICK DISCONNECT SWITCHES

Chance Hook Stick Switches cover a range from 7.5 through 115 KV, 400–600–1200 Amperes. All meet NEMA and AIEE requirements and all pass most severe tests for high currents, icing, insulation characteristics and long life.



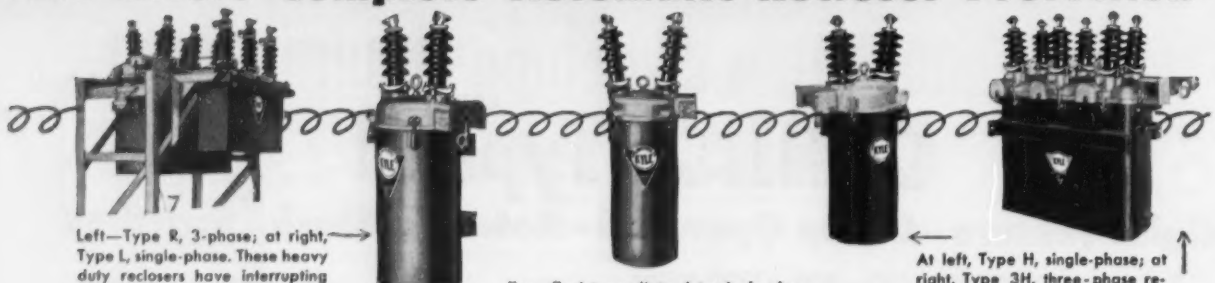
ABC INDUSTRIES

A·B·CHANCE CO·

CENTRALIA, MISSOURI
SAN FRANCISCO, CALIFORNIA

CS54-5

L-M Offers Complete Automatic Recloser Protection

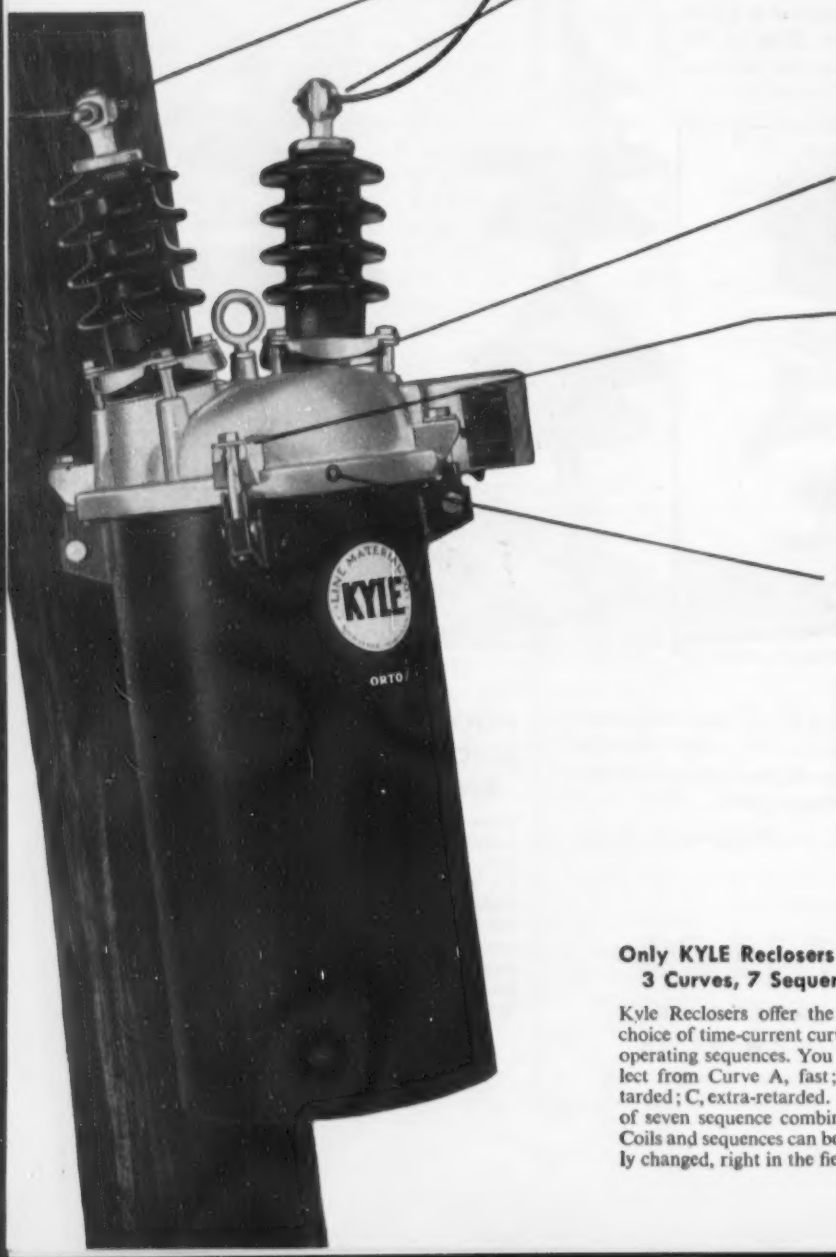


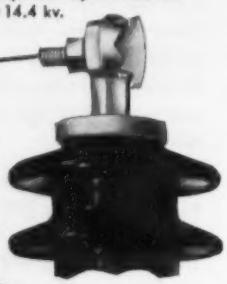
Left—Type R, 3-phase; at right, Type L, single-phase. These heavy duty reclosers have interrupting capacities of 6000 amperes at 4.8 kv, 4000 at 14.4 kv.

Type E—intermediate duty single-phase recloser interrupts up to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv.

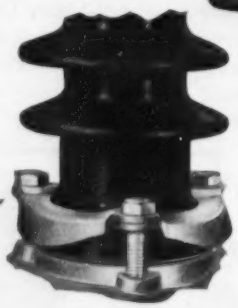
At left, Type H, single-phase; at right, Type 3H, three-phase recloser. These units provide interrupting capacities up to 1250 amperes at 14.4 kv.

With the units shown in the illustrations above, Line Material provides complete, coordinated automatic protection from substation to load—for single-phase and three-phase lines. This complete protection helps maintain service continuity, and cuts service calls by eliminating fuse blowing by temporary faults.



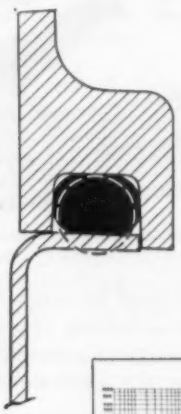


Plated universal terminals for copper or aluminum, No. 8 to 2/0. No loose parts to fall off.

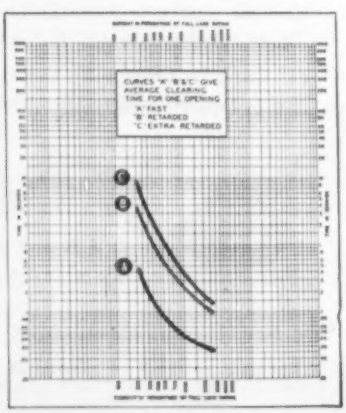


Clamp-on bushings, easy to replace in case of accident.

Head may be rotated to desired position.



Soft O-ring type Buna-N oil-proof rubber gasket completely contained and held under proper pressure against tank rim by deep groove.



Only KYLE Reclosers Offer 3 Curves, 7 Sequences

Kyle Reclosers offer the widest choice of time-current curves and operating sequences. You can select from Curve A, fast; B, retarded; C, extra-retarded. Choice of seven sequence combinations. Coils and sequences can be quickly changed, right in the field.

The sleet hood is large, well proportioned. The counter has been improved. It has larger figures that are easier to read.

Optional non-reclosing device. With lever down, recloser opens once, does not reclose, for greater safety in hot-line work.

L-M's Kyle® Type H Reclosers Offer New Features For Greater Convenience

by **R. C. KIRK,**
Manager,
Kyle Products Sales,
Line Material Company

Perhaps one of the reasons for the wide leadership of Kyle Reclosers is the close attention we have always given to product performance *and* convenience for the operating man. In line with this policy, further improvements have been made in the Kyle Type H, the world's largest-selling oil circuit recloser.

New clamp type bushings are now being used. These make bushing replacement easy in case of accident. Universal terminals are plated for use with both copper and aluminum.

Tank cover clamping and gasketing have been improved to take full advantage of latest gasketing materials. The head is larger, smoothly contoured, with a large lifting eye. Gasket is now a soft O-ring of oil-proof Buna-N rubber, contained in a deep groove which keeps the gasket under controlled compression against the tank rim. Lips on the groove keep the gasket from falling out when head is raised.

The tank itself is slightly larger. Oil capacity has been increased to 4¼ gallons. This, plus the use of ORTO®, L-M's inhibited transformer oil, is extra oil-life insurance.

Sleet hood is larger. Figures on the counter are larger and more legible. The non-reclosing device, shown above, is now available as optional equipment.

Interrupting ratings have been rounded off so that they are all 25 times the coil size. This represents no appreciable change, as there is still a very large margin of safety in Kyle design.

Advantages of Recloser Operation

The use of Kyle Automatic Reclosers helps maintain continuity of service, because the recloser eliminates a large majority of the faults that blow fuses. This cuts service trips, and eliminates the risk of upsetting coordination by installing the wrong size fuse.

Kyle Reclosers themselves offer many advantages. Their operation is accurate and dependable, in all kinds of weather. Kyles provide positive toggle action, fast opening and closing. They do not depend on gravity, motors, or clockwork. Kyles offer a wide choice of time-current curves and operating sequences. Coils and sequences are easily changed, right in the field!

The Kyle hydraulic mechanism is simple, troublefree. Thousands of Kyles are in regular operation from the tropics to Alaska. More than 100,000 Kyle Type H Reclosers prove the value and dependability of the Kyle operating principles.

Ratings of Kyle Type H Reclosers

Coil Rating, Amperes	Minimum Tripping Current, Amperes	Interrupting Ratings,* Amperes, 14.4 kv
5	10	125
10	20	250
15	30	375
25	50	625
35	70	875
50	100	1250

*Symmetrical RMS Amperes at maximum phase to phase nominal voltage of 14.4 kv. Interrupting ratings are based on a maximum test circuit X/R ratio of not less than 8 and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

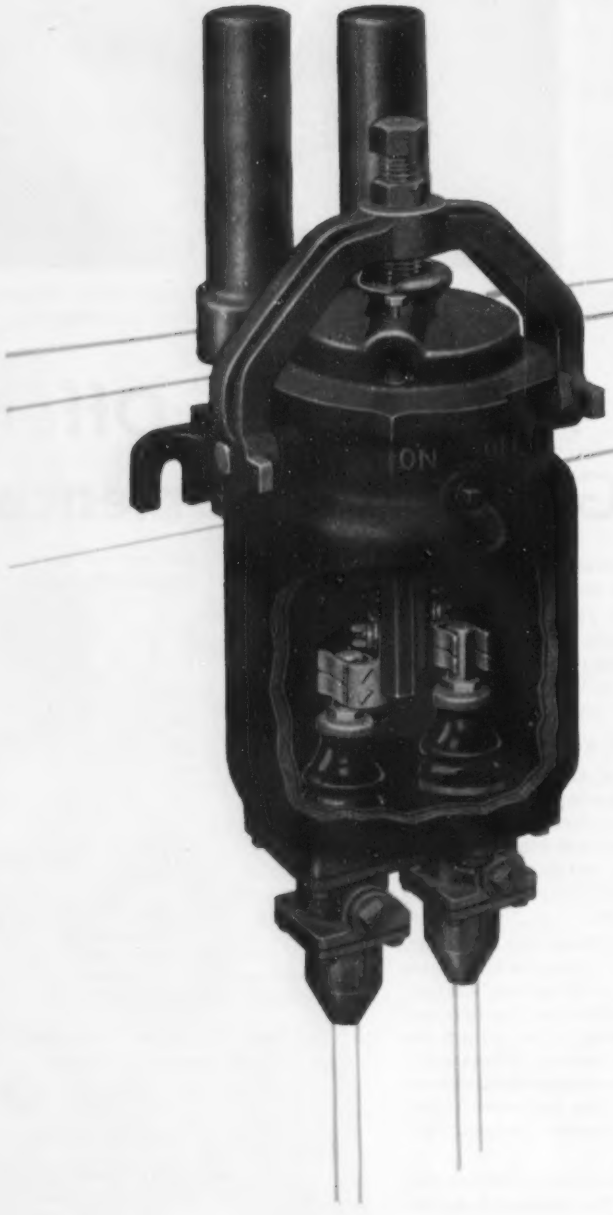
Get Information on Complete Coordinated Automatic Protection

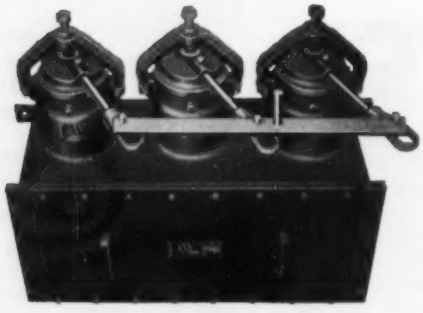
L-M offers a complete line of reclosers and sectionalizers to provide complete, coordinated protection—single- and three-phase—from substation to load.

Ask the L-M Field Engineer for information and bulletins on Kyle apparatus—or write Mr. Kirk at Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division). 161

LINE MATERIAL
Kyle® Reclosers

CAST STEEL TANK (HERMETICALLY SEALED—OIL FILLED) PROTECTS MEN AND EQUIPMENT BY SAFELY WITHSTANDING HIGH PRESSURES OF HIGH VOLTAGE FUSE CLEARING A HEAVY SHORT CIRCUIT





"FC" OIL FUSE CUTOUTS

2500 — 5000 — 8000 VOLTS

In addition to the main purpose—a pressure tight enclosed fuse—the device serves as a full load break oil switch. The gang operating mechanism provides for three phase sectionalizing. The switching contacts are Beryllium copper. Fuse links are simple and inexpensive, easily replaceable in the carrier on the removable cover of the cutout tank.

Welded steel boxes with cutouts on top, enclose connections to feed and load circuits.

Bulletin CA52 gives data and prices. Write for a copy or ask your representative.

G&W "Forethought" CDI-S shows how "FC" cutouts are combined with "RAL" oil switch. Send for your copy, there is no obligation.

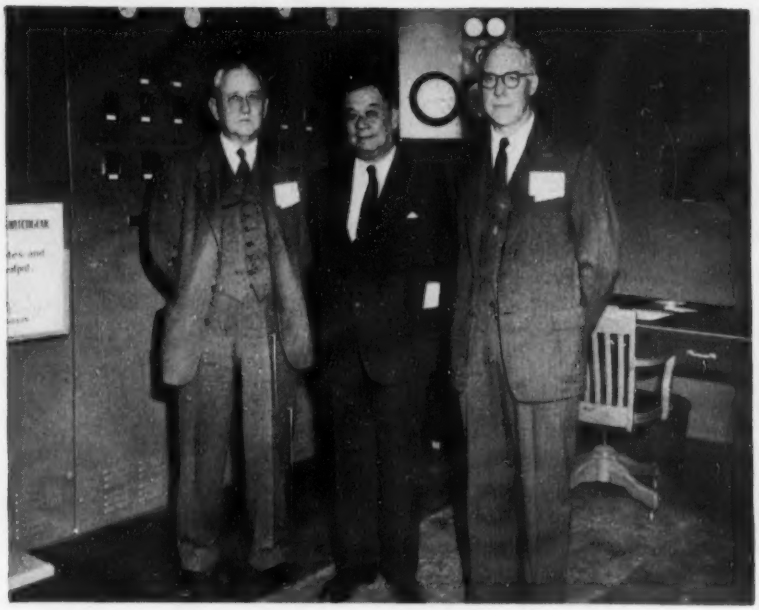
G & W ELECTRIC SPECIALTY CO.

7780 Dante Avenue, Chicago 19, Illinois

Cable Terminating, Connecting and Sectionalizing Devices

Representatives in principal cities of U. S. A.

In Canada—Powerlite Devices, Ltd., Toronto and Montreal



Officials Dedicate Neversink Plant

Dedication ceremonies held early this month at Central Hudson Gas & Electric Corp's Neversink hydroelectric plant were conducted by E. R. Acker (right), Central Hudson president. Other participants were Irving V. A. Huie (center), commissioner and president of Board of Water Supply of New York City, and O. H. Bundy, Central Hudson executive engineer.

The new 25,000-kw plant will use a portion of New York City's drinking water for generation of electric power, reportedly one of the first such operating arrangements in the U. S. The water, in a New York City reservoir five miles from the plant, is piped through a tunnel under a mountain to the plant. Then the water continues to another reservoir and through the Delaware Aqueduct to New York City.

Central Hudson will receive 3.2 million cu ft of water a year for 50 years without cost but will pay about $50,000 for use of excess water each year. City will receive free electric power to operate some portions of the Delaware system. Plant will be turned over to New York City after 50 years.

In his dedicatory remarks, Acker declared the development of the plant was an example of "the highest type of cooperation between government and business in the interest of the people whom they serve."

Export-Import Report Hit by Brown Boveri Official

Brown Boveri Corp, Swiss manufacturer of heavy electrical equipment, has taken strong exception to the report on the export and import of electrical goods prepared by the National Industrial Conference Board. The report, drafted at the request of National Electrical Manufacturers Association, showed that imports of electrical machinery and equipment into the United States are rising at a more rapid rate than exports of the same goods by the U. S. (EW, Dec. 21, '53, p 6).

In a detailed reply, Paul R. Sidler, president of Brown Boveri of New York, an affiliate of the Swiss firm, declared that too great a stress had been placed on the rise in per cent of imports to the U. S. over the average of the years 1935-9. He pointed out that imports during this prewar period were insignificant and that although they rose in the postwar period, they still represented only .5% of total domestic sales.

The Brown Boveri official also took issue with the statement in the conference report that competition from foreign countries for third markets had grown keener. The cases noted to prove this statement, he said, occurred between 1949 and 1953 and the comparison is made between 1949-51 and 1952-3. For an unbiased picture, Sidler declared, figures for the postwar period should have been compared with the prewar period. If this had been done, he asserted, the figures would have shown an increase in U. S. exports to the area in question (Latin America).

Other major criticisms made by Sidler are these:

1. Wage figures quoted in the report for Swiss workers are at variance with statistics furnished by other organizations.

2. Conference report says foreign exporters almost universally get export subsidies or other aid from their governments, but this is not true in Switzerland.

3. Report speaks of import and exchange controls in foreign countries but Switzerland has no such controls.

Sidler also challenged many statements in a report issued by Stone & Webster Corp to the effect that electrical equipment and services provided by foreign firms are not as dependable as that supplied by U. S. firms. He denied that this was true in the case of Brown Boveri and accused Stone & Webster of drawing conclusions from meager evidence when what he termed the correct facts could have been easily ascertained.

McWhorter is Backed in Alabama for TVA Post

A group of Alabama Republicans are out to block the nomination of Harry Carbaugh, Chattanooga, Tenn., as chairman of Tennessee Valley Authority Board.

Alabama GOP group's candidate for the post is an Alabaman, Roger Barton McWhorter, chief engineer of Federal Power Commission.

It is expected that McWhorter's name will be submitted to President Eisenhower and GOP National Chairman Leonard W. Hall soon.

McWhorter reportedly has the support of Claude Vardaman, GOP state chairman and vice president of Alabama Power Co, and Curtis Adkins, Republican national committeeman from Alabama.

The Alabama Republicans are determined to block Carbaugh's nomination because of ill feeling toward the Tennessee Republican "Old Guard" organization which is supporting Carbaugh, according to capital sources.

HELICOPTER (see cover) was used over rapids . . .

. . . by Ontario Hydro engineers taking soundings on St. Lawrence River to make hydro models. In calmer waters, a boat with sound gear served purpose

TRANSIT OPERATOR on shore reads position of boat at the mo-

On the St. Lawrence, Ontario Hydro

While opponents of U. S. participation in the St. Lawrence power project decide whether to take their case to the Supreme Court, Ontario Hydro proceeds with river surveys and the building of models that will save time and money on the big job itself.

What Hydro is learning from the preliminary work may be put to good use before too long, since New York State Power Authority now has defeated opponents to its FPC license to participate all the way through the U. S. Circuit Court of Appeals (EW, March 1, p 5).

Hydro-Electric Commission of Ontario believes the models it is constructing will save millions of dollars by giving its engineers a preview of how the rapids will act once the two-nation team puts up the concrete dams that will harness the river's flow.

"These model studies," said Robert H. Saunders, Hydro's chairman, "are just one phase in the preparations Hydro is making for this great undertaking. Other phases include preliminary general and engineering meetings with representatives of the New York State Power Authority, and, one that is of paramount importance, studies associated with the relocation of and compensation for individuals

. . . to build models which in turn will

USING DATA collected on the river (see above), builders of models at Manby Service Center recreate area to small scale. Plywood templates are filled with compacted sand and topped with concrete. Strips of metal are inserted to simulate water turbulence with accuracy

ment of sounding. He gets his reading cue every 20 seconds from recorder with radio telephone

WATER LEVEL GAGES—50 of them, some automatic—have been placed all along International Rapids Section of the river, which will be affected by construction of power project

engineers are making surveys . . .

whose properties may be flooded as a result of the development so that, when the last legal obstacle to the New York Power Authority's participation has been removed, we will have our suggestions ready to submit to representatives of the communities concerned."

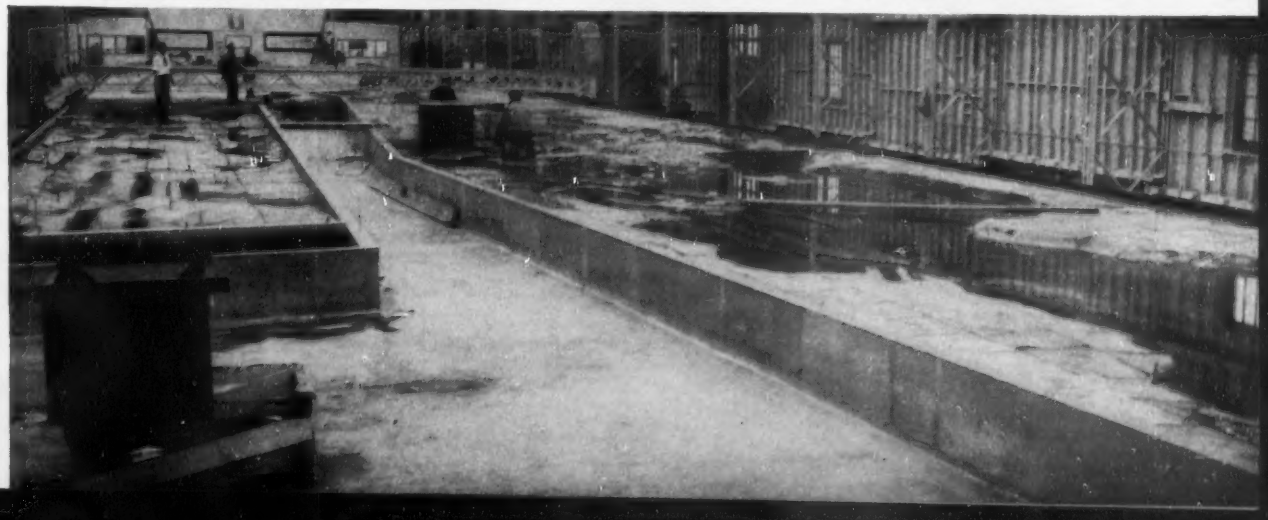
Against that time, model studies go on at A. W. Manby Service Centre near Toronto, Ont. Here Hydro's engineers and mechanics have been making a scale reproduction of 35½ miles of the St. Lawrence. They've duplicated the shore line, contours of the river bottom and turbulence of the water.

For 22 months survey crews have been working over the International Rapids section of the river near Barnhart Island, site of the 36-unit hydro plant and spillway dam that eventually will produce 2.2 million hp.

From the data they have collected, engineers have put together a three-section representation of the river. This plan allows study of each section simultaneously without interfering with work being done on the other sections. Building three separate sections made it unnecessary to lengthen the building in which it is housed. Reduced to a horizontal scale of 1 to

help them build the power project

35 MILES OF RIVER are represented in three model sections shown below. Largest, at right, reproduces distance between Ogdensburg and Leishman's Point. Construction shown in pictures at left (Cat Island area below the power site) is obscured by instrument truss



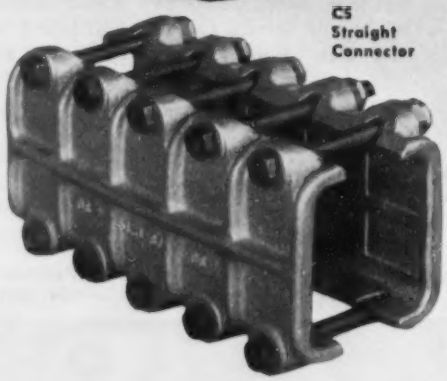
DELTA-STAR builds a *Complete Line* of POWER CONNECTORS

Whatever your requirements there is a Delta-Star connector designed specifically to do the job. Never is there any necessity of adapting a connector to your particular application. There is available at Delta-Star the exact connector you require in clamp or solder types for copper or aluminum conductors with all the characteristics that have won such general acceptance throughout the industry.

Delta-Star clamp type connectors incorporate all three essential requirements of positive electrical and mechanical connection, ease of installation, and continuity of service over long periods of time.

FT
Clamp Type
Connector

TU
High Compression
Connector



CS
Straight
Connector

Positive electrical and mechanical connection — all Delta-Star connectors are cast-to-size and surface strength is left intact by the elimination of machining. Strong gripping action is secured by the retention of a great number of minute projections which dig into the tube or cable as bolts are tightened and help prevent slippage or loosening.

Ease of installation — high compression clamp type connectors are designed as a one-piece unit with U-bolts held securely in position by bent-over yoke projections. Other types are designed whenever possible with two halves of like dimensions. Being interchangeable no care need be taken to keep them in pairs.

Long continuity of service — Delta-Star connectors are cast from an alloy stronger than copper under rigid foundry control. U-bolts and nuts are of DURONZE, a non-ferrous bolt material with a splendid service record. Edges and ends are rounded to eliminate crystallization or adhesion. No detail, however small, which adds to dependability has been overlooked or neglected.

NEW CATALOG now being prepared covers the complete line of Delta-Star Power Connectors: contains Technical Data Section with Tables and Charts pertaining to application of various types. Reserve your copy.

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.
OF PITTSBURGH
2437 FULTON STREET, CHICAGO 12, ILLINOIS
DISTRICT OFFICES IN PRINCIPAL CITIES

H.K. PORTER COMPANY, INC. OF PITTSBURGH

WHEN YOU WANT THE BEST IN HIGH VOLTAGE EQUIPMENT SPECIFY DELTA-STAR

HYDRO MODEL MEN measure rate of flow of water on completed section representing entrance to Canadian Galop Rapids. Velocity is determined by rotating propeller submerged in the water and connected to indicating device. Ratio is 1 to 500,000 cu ft per sec

500 and a vertical scale of 1 to 100, the entire development area covers 9,930 square feet. Rate of flow is set at 1 to 500,000 and velocity at 1 to 10. Water churns over the miniature rapids at the rate of 225 gallons a minute.

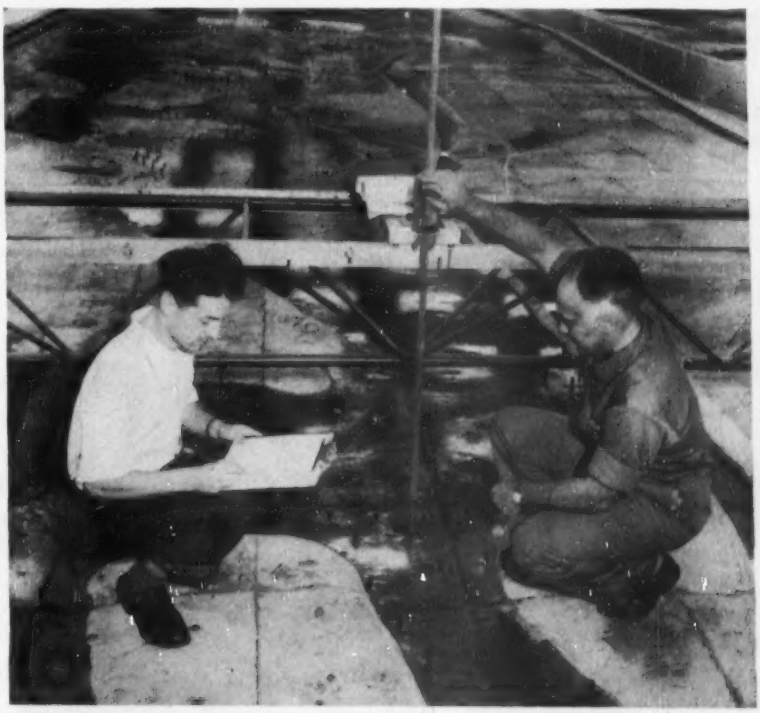
The St. Lawrence models had to be made extremely accurate and kept that way. One eighth of an inch vertically on the model is equivalent of 1 foot on the river—so it's obvious what the slightest foundation settlement or heaving because of frost, would do to computations. Hydro engineers have built in protection against such possibilities.

Human Bees . . . In its early stages, the model looked like a gigantic honeycomb, with hexagonal "cells" replaced by squares. Squares were formed by plywood templates fitted into grooves. Model makers moved from template to template marking contours from plans prepared by hydro survey crews in the 1920's and additional information gleaned from the current surveys. The unmovable cells were filled to within two inches of the contour line with compacted sand and surfaced with concrete. Where excavation was likely, movable concrete cells were used.

How will the completed models be used? Here is one example:

The St. Lawrence plan calls for dredging about 40 million cu yd of earth and rock from the river bed. This naturally will affect the flow of the river. From the model studies, Hydro engineers will know exactly what the effect will be before the dredging takes place. And they'll make their plans accordingly, well in advance of the operation.

Result, the model builders believe, a saving of several million dollars on the dredging operation alone.



WATER LEVELS on main section of model are measured by a point gage supported by instrument truss which straddles it. Truss rides machined rails along curbing on sides of mockup

ROPE CANS pay out rope rapidly and without fouling. Two cans, each containing 1,800 ft of rope, were employed for each of two pulls over a Los Angeles cemetery and recreation area

Saves time, reduces damage to . . .

Lay Line by Helicopter

J. F. MARISCAL
Engineer of Construction

and

W. C. STOOKEY
Assoc Engineer, Construction Section
Department of Water & Power
Los Angeles, Calif.

Pulling in stringing rope over steel tower transmission lines by helicopter is saving the Los Angeles Department of Water & Power time and money and helping to maintain good public relations by reducing construction time and damage to shrubs and trees.

Stringing of new transmission conductors is part of the reconstruction job the department is doing on its original 110-kv lines built as long as 37 years ago. All lines are now being reconductored and rebuilt for 138 kv.

Use of the helicopter was suggested following the successful laying of a ⅛-in. cotton cord by biplane (EW, March 9, 1953, p 118) and a ⅛-in. steel pulling cable by helicopter (EW, April 10, 1950, p 96) through dense tropical growth in mountainous terrain of the Hawaiian Islands.

Use of the helicopter seemed advisable in view of changes in the area traversed by the transmission lines. An expanding population has turned what was an agricultural and undeveloped area into a residential and commercial one. The lines also traverse the new and large Forest Lawn cemetery and Griffith Park, an attractive recreational center. In erecting towers and stringing conductors, the department sought to minimize damage to trees and shrubbery.

TEMPORARY ARMS at top of tower aided laying rope over the towers

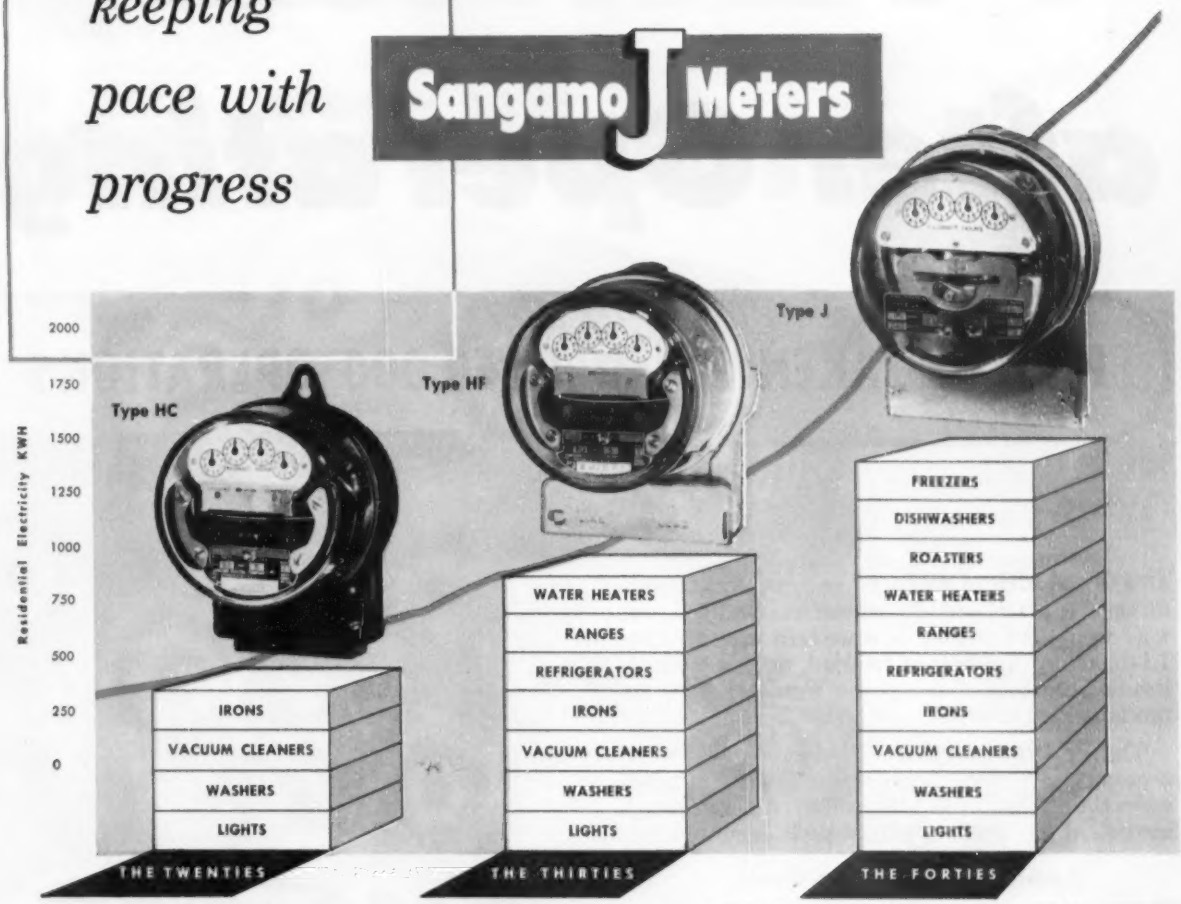
HELICOPTER pulls 138-kv conductor drag line over big trees. Method saves time, cuts property damage

Job Done in 14 Minutes . . . In stringing conductors through the Forest Lawn and Griffith Park areas, a helicopter pulled through the ground lines. The aircraft landed at the starting point, picked up the rope end, and strung and laid it across the tops of towers for about 3,600 ft.

Two lines were laid involving two trips and a total flying time of 14 minutes. This operation would have taken a small crew of men several days to accomplish. Average contract rental cost of a helicopter is about $60 an hour. To eliminate snagging, the rope was paid out to the helicopter from cans used for a Lyle rope gun. Two cans holding 1,800 ft of rope were required for each pull. Rope in these cans is coiled to permit rapid feedout without fouling of the rope.

keeping pace with progress

Sangamo J Meters



In the 1920's, the concept of a full-use customer was one with lights, an iron, and a vacuum cleaner. Today, the full-use customer has a range, water heater and many other major appliances.

Through these years, Sangamo Meters have been adequately measuring these growing loads. Since 1940, the Type J has provided completely accurate measurement of large domestic loads as well as the loads of the small-use customer.

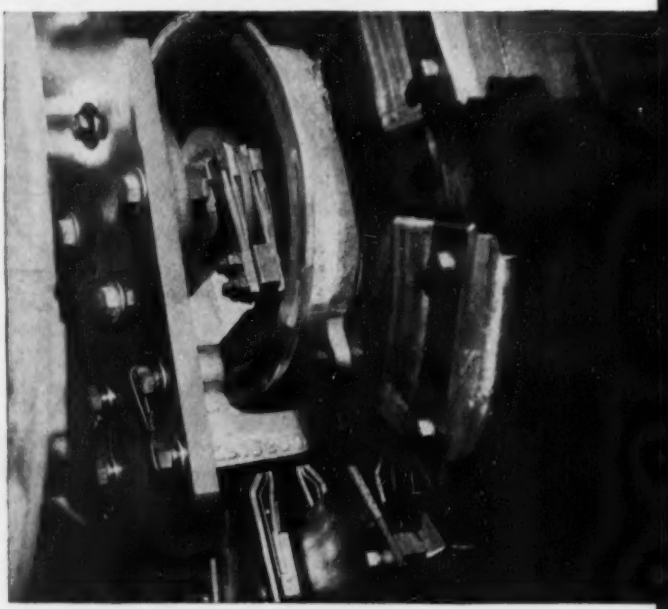
J Meters have met all requirements of the customer, the utility company and the meter superintendent. They have measured with great accuracy—have required little maintenance—and they have been easy to test and to repair.

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Only Measured Facts are Known Facts

Practically after Operating

PHOTOS TAKEN AFTER 1,240,000 OPERATIONS



The unretouched pictures at right show the condition of contacts and mechanism disassembled from a 17-year-old regulator of a western utility. After 1,240,000 tap changes under load, neither mechanism nor contacts of this power regulator show appreciable sign of wear.

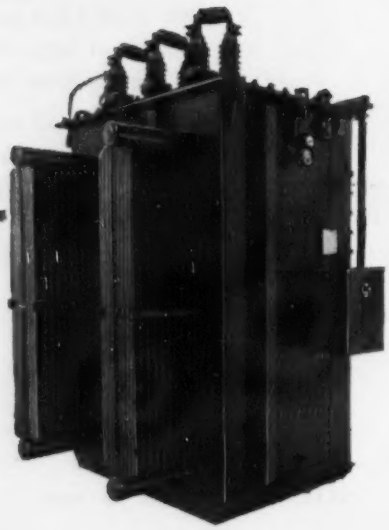
The regulator was disassembled when it was found necessary to replace deteriorating gaskets installed when the regulator was built in 1937. After thorough inspection the unit was placed back in service.

Field and Laboratory Proof

This operating record offers field proof in addition to laboratory tests that have proved you get years of practically trouble-free operation from Allis-Chalmers ⅝% step regulators.

You get the reliability and rugged construction of the *Quick-Break* mechanism on all Allis-Chalmers ⅝% step voltage regulators as well as on transformers equipped with tap changing under load. Performance records like this one — in thousands of applications — are convincing proof that it pays to have Allis-Chalmers tap-changing equipment on your system.

A-4244



Designed Features Add to Service Life

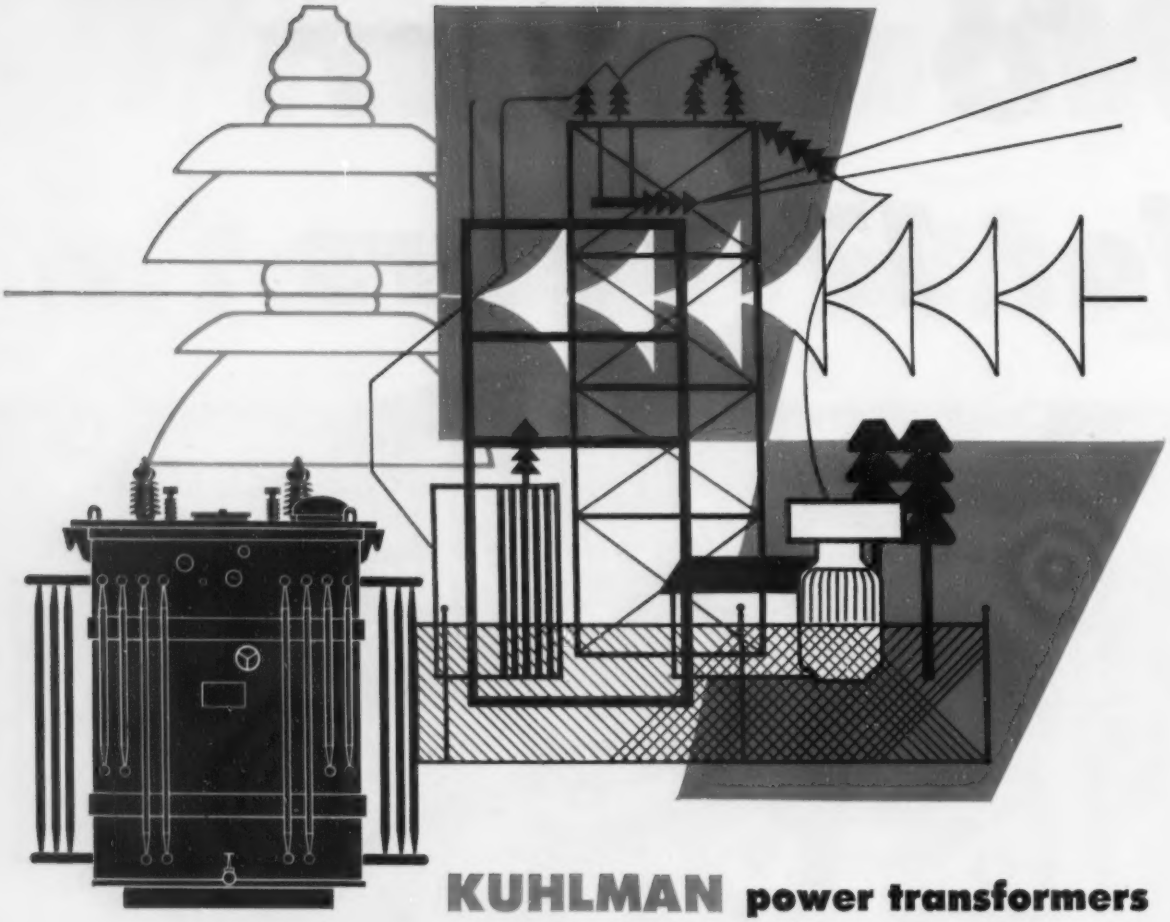
There are four reasons why you get such an excellent service record from Allis-Chalmers regulators. (1) Contacts are large. (2) They are manufactured from arc-resisting materials. (3) The small ⅝% steps reduce the amount of kva to be interrupted. And (4), perhaps most important, famous *Quick-Break* mechanism provides fast, clean contact separation, snapping the moving contacts from one position to the next before there is time for damage to occur.

In addition, with all Allis-Chalmers ⅝% step regulators you get advantages like unit construction, *Feather-Touch* control, and twenty years of experience with ⅝% step equipment. Get the complete story from your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

No Wear for 17 Years

ALLIS-CHALMERS

Originators of 5/8% Step Regulators



KUHLMAN power transformers help supply the electricity for America's growing needs

In the great Pacific Northwest where serious power shortages were slowing down production and threatening our national economy; in the arid southwestern plains where electric power was needed to irrigate desert lands and encourage agricultural development; in new industries and new communities that have required new electrical facilities as well as in existing industries and communities that have outgrown their electrical facilities, Kuhlman Power Transformers are now on the job, providing a steady and dependable source of power. Kuhlman Transformers have been a major factor in the growth and development of America for many years. In fact, since the Kuhlman Electric Company began doing business sixty years ago, their contributions in the field of transformer design have helped the electrical industry keep pace with the needs of American industries and utilities. Kuhlman is continuing its leadership in this field today.

Kuhlman Power Transformers are specifically engineered to meet the needs of utilities and industries. Employing a basically simple engineering design and built with quality materials, Kuhlman Power Transformers can be produced in a wide variety of ratings, with accessories to suit the specific needs of utilities and industries. For complete information, write for Bulletin CS-601. Kuhlman also builds Distribution, Dry Type, Saf-T-Kuhl, Subway, CSP and Series Street Lighting Transformers. Bulletins are available on these models as well.

151-M

KUHLMAN

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN • Southern Division, CRYSTAL SPRINGS, MISSISSIPPI

EXPORT REPRESENTATIVE: INTERNATIONAL STANDARD ELECTRIC CORP., 15TH FLOOR, 50 CHURCH STREET, N. Y. 7, N. Y. CABLE ADDRESS: MICROPHONE, N. Y.

SIXTY YEARS OF PROGRESS IN THE ELECTRICAL INDUSTRY

EEI Sales Parley . . .

. . . set for April 5-8 at Edgewater Beach Hotel in Chicago. Speakers include Walter Sammis, Mrs Ivy Priest

Competitive selling in 1954 will be emphasized at the 20th annual sales conference of Edison Electric Institute to be held April 5-8 at the Edgewater Beach Hotel in Chicago.

Among the speakers who will address the more than 1,000 top level sales executives of the electric industry expected to attend the conference will be Walter H. Sammis, president of Ohio Edison Co and Edison Electric Institute. His topic will be "That 100 Millionth Kw."

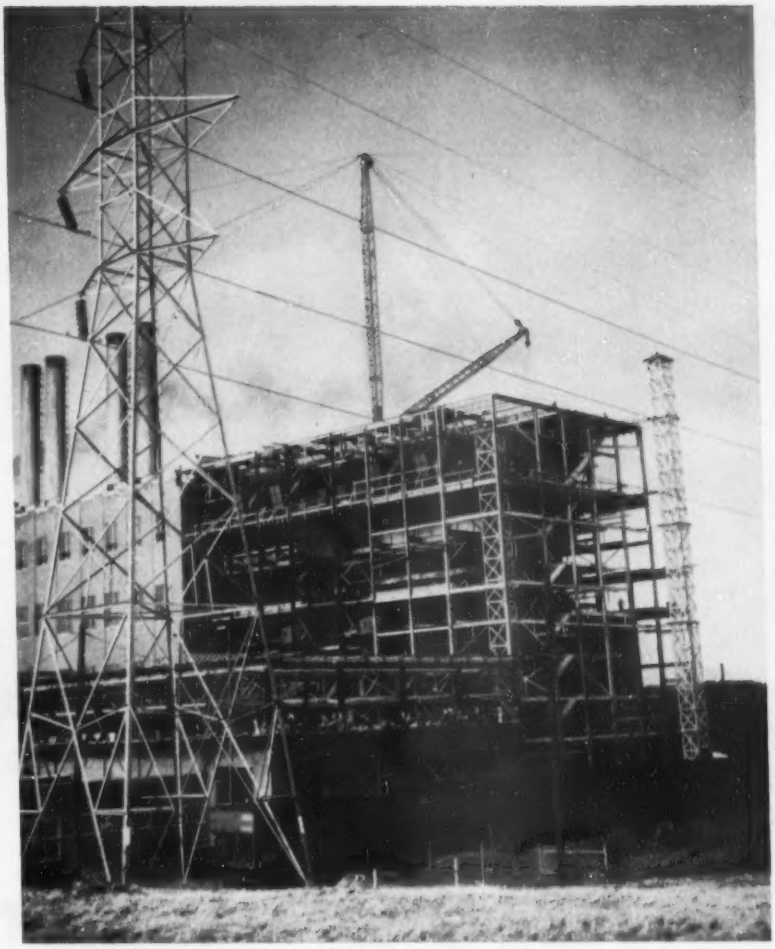
Mrs Priest to Speak . . . Slated to speak at one of the sessions of the conference's full-day home service meeting is Mrs Ivy Baker Priest, treasurer of the United States. In addition, leading home economists from electric utilities and manufacturers will discuss latest developments and techniques in the home service field.

Agenda for the conference calls for four concurrent sectional meetings to cover selling techniques needed to overcome sales resistance in these four major markets—commercial, farm, industrial, and residential.

To highlight the industrial market, Tomlinson Fort, vice president of Westinghouse Electric Corp, will analyze "The Future of Industrial Power." Attention will be devoted to the residential market when Roy Johnson, executive vice president of General Electric Co, delivers a talk on "More House Power to You."

Awards Presentation . . . In addition to the general sessions scheduled for April 7-8, Commercial Division's 19 committees meet April 5.

Highlight of Wednesday morning's session will be presentation of annual awards honoring outstanding promotional activities by electric utilities in the fields of planned lighting, farm electrification, industrial electrification, electric appliances, electric laundry equipment, and home service. Although the awards are presented by prominent electrical manufacturers, publications, and associations, the contests were conducted through Edison Electric Institute.



Enlarging Riverbend's Capacity

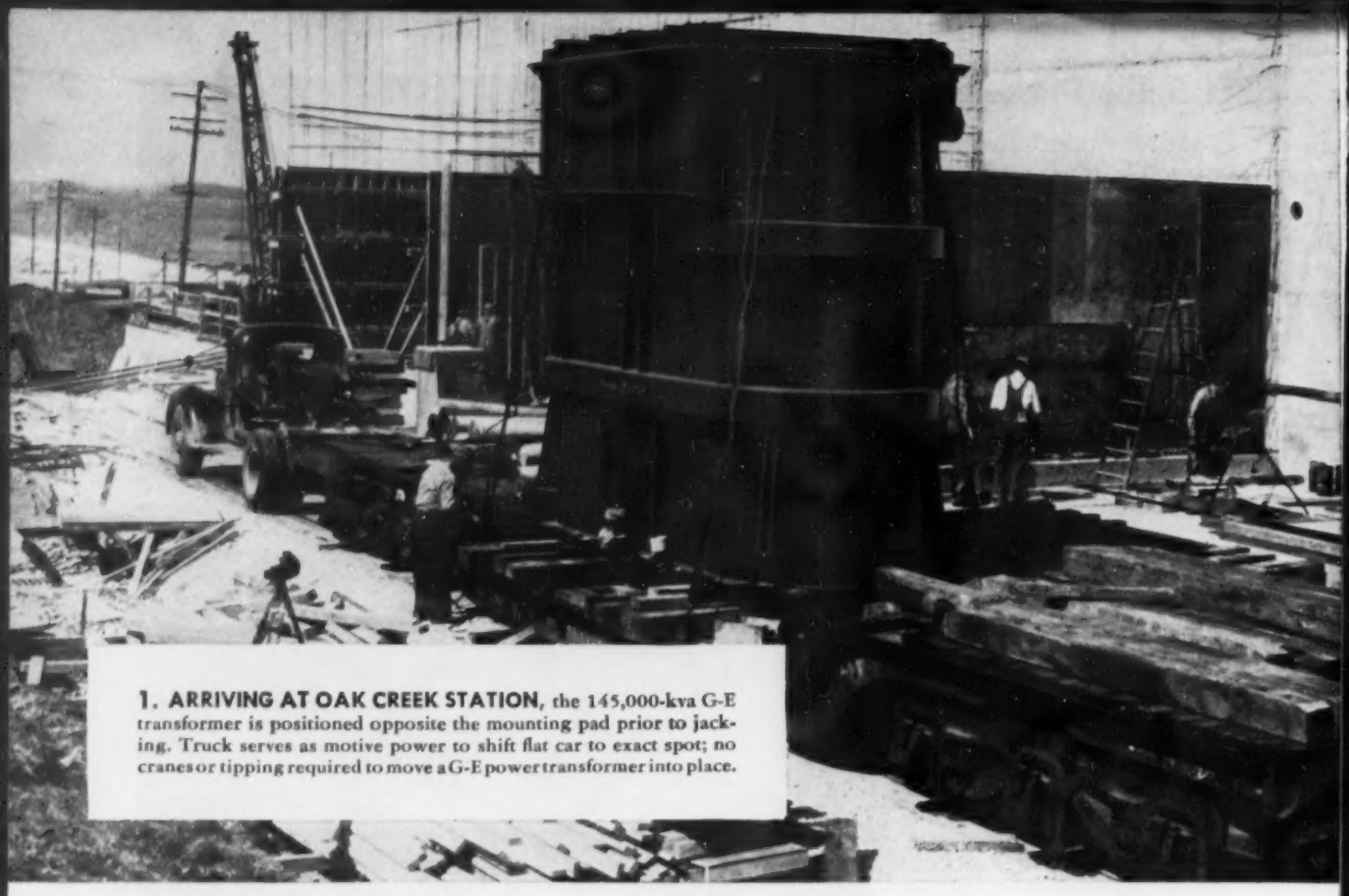
Addition now being constructed at Duke Power Co's Riverbend Steam Station will make the plant the largest in the company's system. Units to be added each will have a capacity of 140,000 and boost the plant's capacity to 665,000 kw. The plant is located in the center of Duke's system. First of the new units is scheduled to go into operation about Aug. 15, 1954, and the second in October of that year.

Bill Would Give Scotland Control of Own Power

LONDON—(McGraw-Hill World News)—The British Government's long-awaited plan for giving Scotland greater control over its own power supply recently was published in the Electricity Reorganization (Scotland) Bill.

The main effects of the bill to be effective April 1, 1955, are to abolish the authority of the British Electricity Authority in Southern Scotland, to substitute for it a South of Scotland Electricity Board, and to transfer from the Minister of Fuel and Power to the Secretary of State for Scotland most of the ministerial responsibility for the undertaking.

The new South of Scotland Electricity Board will be established much as the North of Scotland Hydro-Electric Board was established under the act of 1943. The Hydro-Electric Board's status remains broadly unchanged, except that it is to be excused from the existing statutory duty of submitting its constructional schemes for the approval of the British Electricity Authority. In future it will report to the Secretary of State.

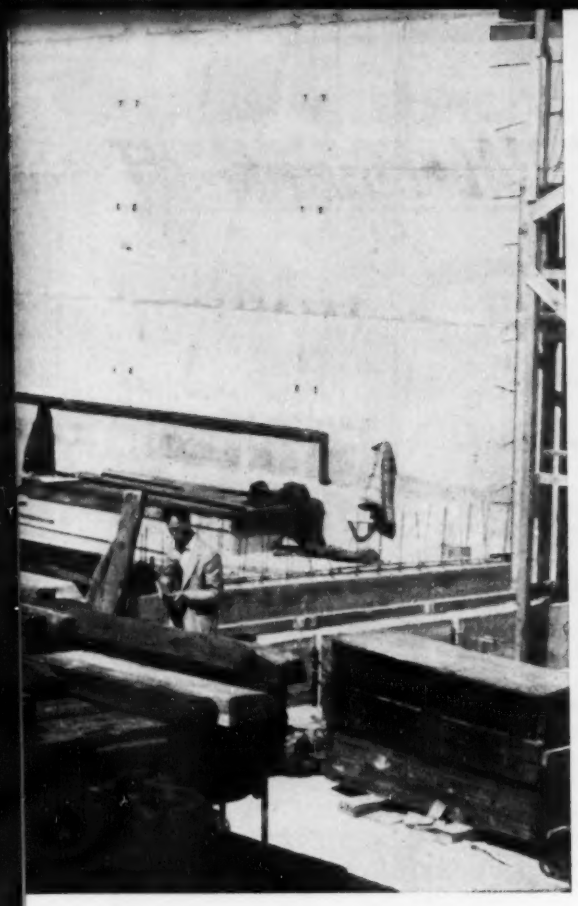


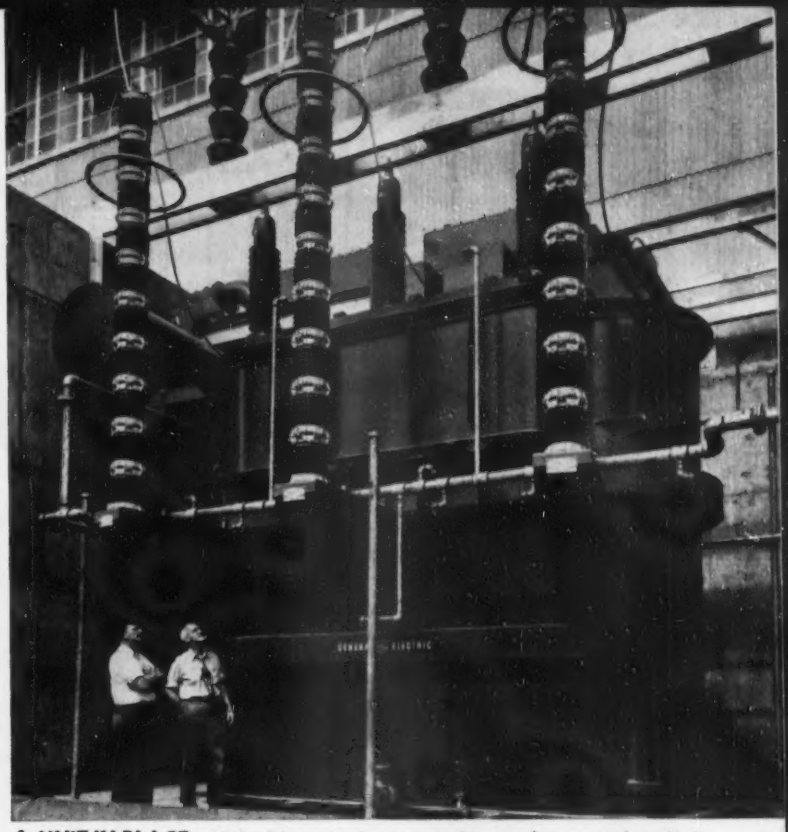
1. ARRIVING AT OAK CREEK STATION, the 145,000-kva G-E transformer is positioned opposite the mounting pad prior to jacking. Truck serves as motive power to shift flat car to exact spot; no cranes or tipping required to move a G-E power transformer into place.

UPRIGHT SHIPMENT SPEEDS

2. AFTER JACKING the unit is ready to be moved to the pad. Next step is to put wooden rollers in place. Total time required for jacking, positioning skids and rollers, and moving unit to foundation was 2½ days. Only truck winches were needed.

3. BLOCKS ATTACHED and ready to start rolling. Workman checks position of rollers before starting the shift from flat car to pad. While nearness of siding to pad helped reduce time, upright shipment simplifies any installation.





4. UNIT IN PLACE with bushings, cooler connections, and arresters installed. Only 4 operations were necessary to complete the installation of this 145,000-kva G-E transformer. Upright shipment makes the job easier!

G-E TRANSFORMER INSTALLATION

145,000-kva units for WEPCO shipped upright in one-piece tanks for easier, faster installation—at less cost

One of two General Electric 145,000-kva forced-oil water-cooled power transformers is shown being installed at the new Oak Creek station of Wisconsin Electric Power Company. These units are step-up transformers applied to raise generator voltage from 13,200 volts to 138,000 Gr Y for high-voltage transmission.

Installation was faster due to G-E one-piece tank construction and upright shipment. Installation time ran as follows: Jacking, 2 days; moving to pad, ½ day; installing bushings, 1 day; filling with oil and installing accessories, 1 day.

Only 4 operations are required to install large G-E power transformers:

1–Slide off flat car onto pad—no tipping, no top tank-sections to assemble.

2–Install bushings, radiators, and accessories.

3–Fill with oil and connect oil preservation equipment

4–Connect to line and energize.

Upright shipment saves time, money. Instead of arriving on its side, or in sections—which would require expensive tipping and assembly operations—all G-E transformers arrive upright . . . ready to slide off the flat car to the foundation. This means that G-E transformers can be installed faster and easier. Utilities report that upright shipment has saved them up to $1750 per unit in installation costs.

Why can G-E units be shipped upright? All G-E transformers have concentric windings. These windings have higher thermal, mechanical and electrical strength, yet are very compact. They permit transformers to be fitted into smaller tanks which can be shipped in the upright position.

For full information about G-E power transformers, get in touch with your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

421-12

You can put your confidence in—

GENERAL ELECTRIC

POWERS American AERIAL EQUIPMENT

AERIAL TOWERS

Series 7A-01 . . . in sizes for safe, smooth elevation to 21′ or 25′. Equipped with telescopic ladder. Operation from cab or tower. Platform revolves 360°.

HYDRAULIC AERIAL TOWERS

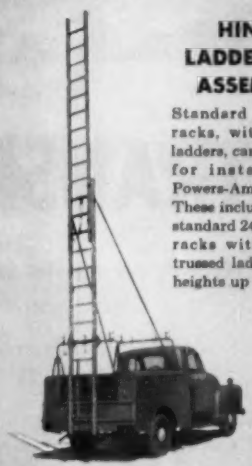
Series TW-2 . . . enables workmen to reach areas more than 35′ above ground. Can be operated from tower or truck cab. Platform revolves full 360°. Telescopic ladder is standard equipment.

REVOLVING Fully-Powered HYDRAULIC AERIAL LADDERS

Series HL-35 . . . elevates, extends, lowers, and retracts by *hydraulic power*. Available in sizes having ground-to-platform height up to 35′. Revolves full 360°.

REVOLVING AERIAL LADDERS

Series 5510 . . . perfectly balanced to permit fast, easy elevation. In sizes having 23′6″, 26′6″, and 30′6″ ground-to-platform height. Can be spotted at angles from 30° to 75°, and revolved full 360°.



HINGED LADDER RACK ASSEMBLIES

Standard and special racks, with extension ladders, can be furnished for installation on Powers-American bodies. These include racks with standard 24′ ladders, and racks with braced or trussed ladders to reach heights up to 30′.

A descriptive bulletin is available on each item of aerial equipment in the Powers-American line. Bulletins, plus prices and complete details, are yours for the asking.

McCABE-POWERS AUTO BODY COMPANY

MAIN OFFICE
5900 NO. BROADWAY • ST. LOUIS 15, MO.

WESTERN OFFICE
428 LATHAM SQ. BLDG. • OAKLAND 12, CALIF.

TRAINING of sales department personnel and conferences with affected local supplier, construction and financial interests provide a

Sound Start for Space Heating Sales

In a series of meetings, February 8, 10 and 11, Union Electric Co of Missouri launched an electric space heating sales program. Architects, builders, electrical and heating contractors, distributors and dealers, and representatives of financing interests were invited. Over 400 of them attended.

Purpose of the meetings was to get utility promotion of space heating for industrial and business places and for homes off to a sound start. Obviously such a beginning could be had only with the understanding cooperation of all the other interests concerned.

Basis of talks and discussions at the meetings was the contents of a booklet, "Electric Heating Facts," published by the utility. Much of the material of the booklet is information on costs of operation, user experience and thermal insulation requirements obtained from around 600 electric heating installations on the company's system.

The booklet served also as a sort of training manual for employee courses on space heating carried on in conjunction with the industry meetings. This course was given to sales department personnel who would need to be well informed on the facts of space heating in their contacts with customers.

SUPPLIERS of space heating equipment were invited to show their wares so that company people and others concerned could learn about them

Steel Tower

Steel-tower was preferred to wood-pole construction by Florida Power Corp for its newest transmission line which crosses 101 miles of rough terrain in an area frequently hit by hurricanes. Only steel, the company decided, could give the desirable reliability where maintenance could be a formidable problem.

The greater length of the line, connecting the new 135,000-kw Higgins plant on Tampa Bay with the 60,000-kw Avon Park plant in central Florida, is outside the usual service area and remote from Florida Power's regular maintenance crews.

Steel Towers Economical . . . Florida Power also considered steel towers economical for completion of a "backbone" transmission system from Jasper, near the Georgia border, south and east to Avon Park, present southern extremity of its transmission and generation system. The total line length is 292 miles. The last gap in this steel-tower "backbone" was closed and energized last November.

The continuing rise of materials and labor prices, Florida Power decided, would offset any savings from the use of wood-pole construction. The lower annual cost of wood construction would be cancelled by increases in labor and material. Such increases have more than tripled replacement costs in the past 25 years, and it seemed reasonable to assume that replacements 25 years hence would triple today's costs. It also seemed probable that the estimated savings of wood-pole, compared with steel-tower, construction could not be realized over the life of a tower line.

Lengthy Outages . . . Long outages would be a certainty if such a line were on wood poles. Hit by a full-fledged hurricane, it would suffer several structure failures, and the trouble spots would be rendered inaccessible to maintenance crews for considerable time by flooding caused by the torrential rains that accompany hurricanes.

Only steel could withstand the annual burning-over of the low flat-woods pastures which the route traverses for 68 of the total 101 miles. These flat-woods, interspersed with swamps, are impassable for heavy truck equipment, except during the dry season of several months.

Florida Power planned its line when a large capacity east-west connection was required for the transfer of increased power to the 110-kv system at Ft. Meade. This link became desirable after the installation of the Higgins Plant and the addition of a unit at Avon Park. Formerly, the southern ends of the east and west sides of the transmission system were joined through the Tampa Electric Co system's 66-kv lines. On these, the load was reaching maximum capacity without Florida Power's tie-line loads being superimposed.

Right-of-Way Conditions . . . The route planned for the new line lay across low flat-woods pasture lands, spotted with swamps and small lakes, westward through 43 miles and southeastward 25 miles.

The 33-mile section northwest of Ft. Meade crosses a rich phosphate rock mine area and numerous citrus groves. Deviations were necessary to skirt phosphate deposits worth up to $10,000 per acre.

Route location was restricted by a military airfield on the west, and town areas and abandoned phosphate mine pits on the east. Abandoned mine property was impractical, as

Line Withstands Florida Hurricane

Provides service continuity along route (See map) through rugged terrain, including the Peace River Swamp (far left photo) where water is 7 ft deep and run-off is slow in wet season. Towers straddle rows of citrus trees (left photo) to permit passage of trucks and tractors drawing harrows

C. B. BENHAM, Transmission Engineer, Florida Power Corp, St. Petersburg, Fla.

tower foundations would cost at least $15,000 each, and the tower sites would be frequently inaccessible. In some of the more accessible areas, land values were as high as $14 per front foot, too costly for transmission line right-of-way.

Comparative Costs . . . The 176-mile Jasper-Tarpon Springs 110-kv insulated double-circuit steel-tower line, constructed 26 years ago, with one circuit initially installed, cost Florida Power $6,866 per mi. This line, good for another 25 years, now has the second 110-kv insulated circuit installed. Material and labor costs have increased, however, so that a single wood-pole 69-kv insulated line through the area now costs $9,305 per mile.

The double-circuit steel-tower line was estimated to cost $38,129 per mile. Costs per mile for two single-circuit, H-Frame wood-pole lines would be $33,236, or for a double-circuit, H-Frame wood-pole line $29,941. Scarcity of available right-of-way ruled out two single-circuit, H-Frame lines, and lack of wood poles in the heights and sizes required for a double-circuit, H-Frame line precluded this alternative.

Double-circuit, H-Frame construction would have required 1,700 of the 90-ft Class 2 poles, or 1,800 of the 85-ft Class 2 poles. Furthermore, either wood pole construction would have resulted in a considerable increase in line length to avoid long-span lake and swamp crossings.

Steel-tower construction easily spans lake and swamp crossings. It also furnishes the long spans and particularly the high clearances for passage of draglines and other mining equipment under the line along the route where it skirts the phosphate mining area.

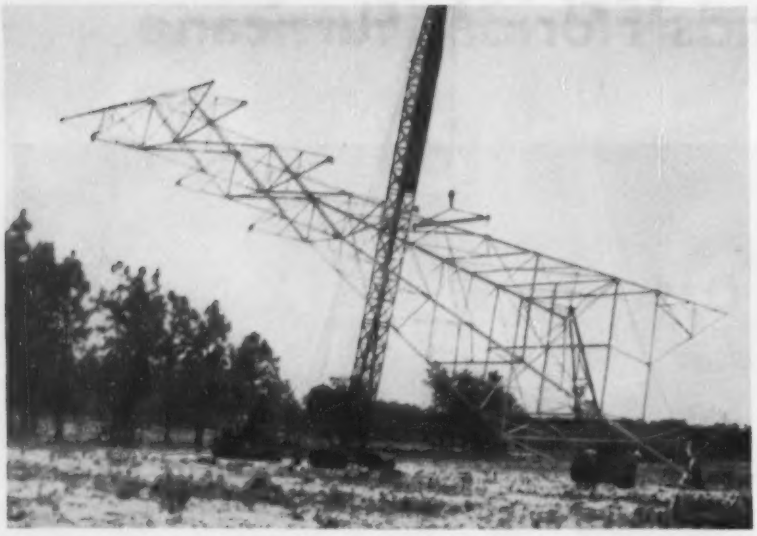
Designing the Line . . . In designing the 101-mile line to be hurricane-proof, a wind loading or 45.6 psf was on the conductors and 72.9 psf on 1½ times area of steel in one face of the tower. Pressures are equivalent to a wind velocity of 135 mph.

Under these loads, the towers were designed to withstand one broken conductor or overhead ground wire without exceeding the elastic limits of the steel. The concrete footings had to be larger and deeper than normal because the soil is very sandy and the ground-water table is close to the surface during the hurricane season. The high ground-water table at most of the tower locations reduces the resistance of the footings to uplift by hydrostatic action.

Two Tower Types Used . . . Line construction consists of double-circuit, steel tower design with two overhead shield wires. Conductors are No. 4/0 stranded copper, and overhead shield wires are ⅜-in. copperweld. Average distance between is 1,028 ft, or about five per mile. Maximum span is 1,215 ft.

Two tower types are used. One is 114 ft high and weighs 6½ tons and has a design span of 1,100 ft. The other is 119 ft high, weighs 7½ tons, and has a design span of 1,210 ft. Design was based on the towers' ability to withstand without failure a hurricane wind loading of 135 mph and to have an average of 1½ to 2 tripouts from lightning based on the area's isokeraunic level of 90 lightning storms a year.

Other Provisions . . . To insure a hurricane-proof line, the right-of-way is cleared of danger trees for 50 ft on each side of the centerline. Danger



STEEL TOWERS were assembled on ground and erected on prepared foundations by an 85-ft derrick on caterpillar treads attached to TD-14 tractor. TD-9 tractor is steadying base

trees, in the sense used here, are any trees which in falling toward the line, would come within 5 ft of the conductors.

Easements for the right-of-way prohibit the construction of farm buildings closer than 50 ft to the line. This last measure reduces fire hazards and obviates the probability of roofs being blown into the conductors.

Acquisition of right-of-way through the numerous citrus groves was facilitated by using towers with a leg spread approximately equal to the tree-row separations. This design minimizes obstruction to grove cultivation by tractors with harrows.

Tower Foundations . . . For locations where ground water is more than 2 ft below the surface, footings for the 114-ft high suspension towers are of plain concrete, containing 4½ yd, 6 ft high, with a base area of 52.5 sq ft. Footings are increased to 8 ft depth, with 64-sq-ft base area, in locations where ground water is less than 2 ft below the surface.

Footings for the 119-ft high suspension towers are of reinforced concrete, slab-column type, containing 6 yd, 8½ ft high, with a slab area of 85½ sq ft and 21 in. deep.

Dewatering . . . Because of the short dry season, almost every tower site needed dewatering. Well-point equipment accomplished this. In the southeastern 26 miles, soft lime rock was encountered only a few feet below ground, and some tower sites had to be drilled and dynamited to install the well points.

Most foundations could not be installed during the dry season. As a consequence, a large portion of the right-of-way required temporary road construction to enable the heavily loaded concrete trucks to reach tower sites.

Other Difficulties . . . In dry weather, the loose sand made it necessary to pull the concrete trucks from the public roads to tower sites by the use of tractors with caterpillar treads.

Templets were used to install all foundations. Six templets were required for suspension towers, and one for each of the three angle dead-end type towers.

Use of the templets permitted a fast rate of progress in the sequence of excavation, setting of foundation forms, alignment and leveling of the steel angle anchor stubs, pouring of concrete, stripping of forms, and backfilling of excavations.

Work Crews . . . The contractor handling the foundation work used two excavation crews with small mobile draglines. He also used one crew for setting foundation forms, one crew for pouring concrete, one crew for stripping forms and templets and hauling them to the next prepared location, and one crew with a small bulldozer for back-filling the excavation and leveling the tower site. The forms were used over and over again, and the concrete was brought to each site by redi-mix trucks. Foundation forms were made with four separate sides bolted together for easy stripping, removal, stacking, and hauling and assembling at the next location.

A well-point crew preceded the excavation crew by several days at most tower sites to lower the water-table. This provided a dry hole for form setting and pouring concrete.

Foundation work was scheduled very closely to allow concrete to cure for at least two weeks before arrival of the tower erection crew.

Tower Erection . . . Tower steel was assembled completely on the ground, and the entire tower was erected on a prepared foundation. An 85-ft derrick was mounted on two caterpillar tread-tracks for a base and attached to a TD-14 tractor with a rigid draw-bar and tongue arrangement to hold the base of the derrick in place. The lifting cable was operated from the tractor winch.

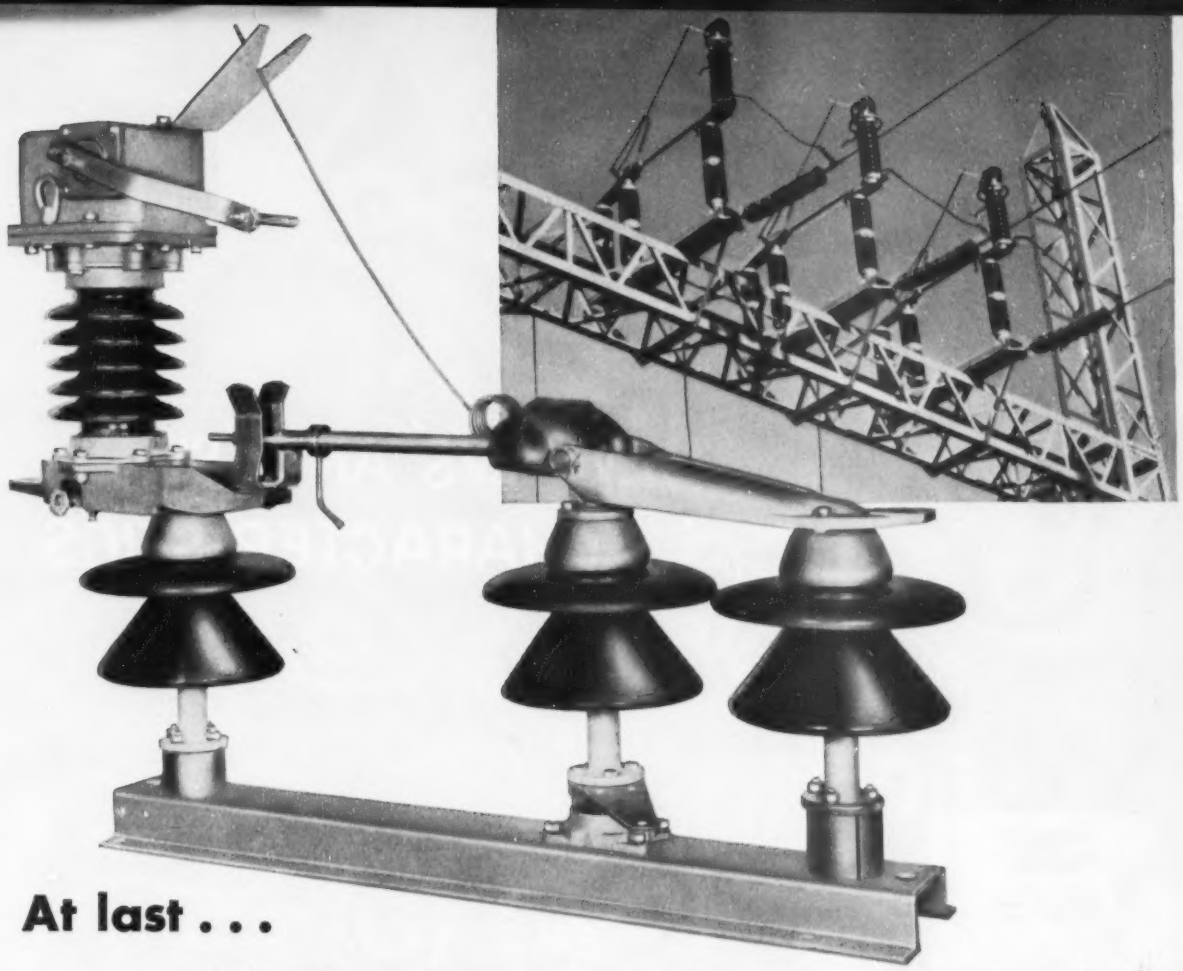
A TD-9 tractor, equipped with a pole-setting gin, controlled and steadied the movement of the tower base during lifting and setting on the foundation legs. Using this equipment, an 11-man crew erected five towers a day when no right-of-way obstruction prevented moving the equipment between tower sites.

When skirting swamps, rivers, lakes, cultivated fields, mining areas, or highways compelled leaving the right-of-way, the tower erection crew averaged three a day.

Towers Per Day . . . Crews of 10 men each assembled an average of five towers per day. One 10-man hauling crew supplied the four assembling crews by bringing steel from the various railroad siding storage places to the tower sites ahead of the assembling crews.

The 85-ft derrick could be lowered partially by a hand winch mounted on the draw-bar tongue for hauling by the tractor to the next tower location.

Actual experience indicates that this method of tower erection saves approximately $120 per tower compared to the "straight-up" method of erection, piece by piece.



At last . . .

a switch that interrupts load current safely!

Exclusive Westinghouse VLB Switch can reduce switching costs—Now you can use the inexpensive Westinghouse VLB Switch to interrupt load currents on high-voltage transmission lines. The arc is completely enclosed so that it *cannot* develop into a system fault—a distinct possibility if horn-gap switches are used for interrupting duty (a job for which they're not designed).

Interrupts 600 amps—The VLB interrupts line-charging current, transformer magnetizing current or up to 600 amps of load current. Dependable performance under all these conditions provides the basis for interrupting rating.

New interrupter—The problem in designing the VLB Switch was to develop a small but effective interrupter to add to the standard air break switch. It was solved by using a gas, sulfur hexafluoride, which has exceptional arc-extinguishing properties.

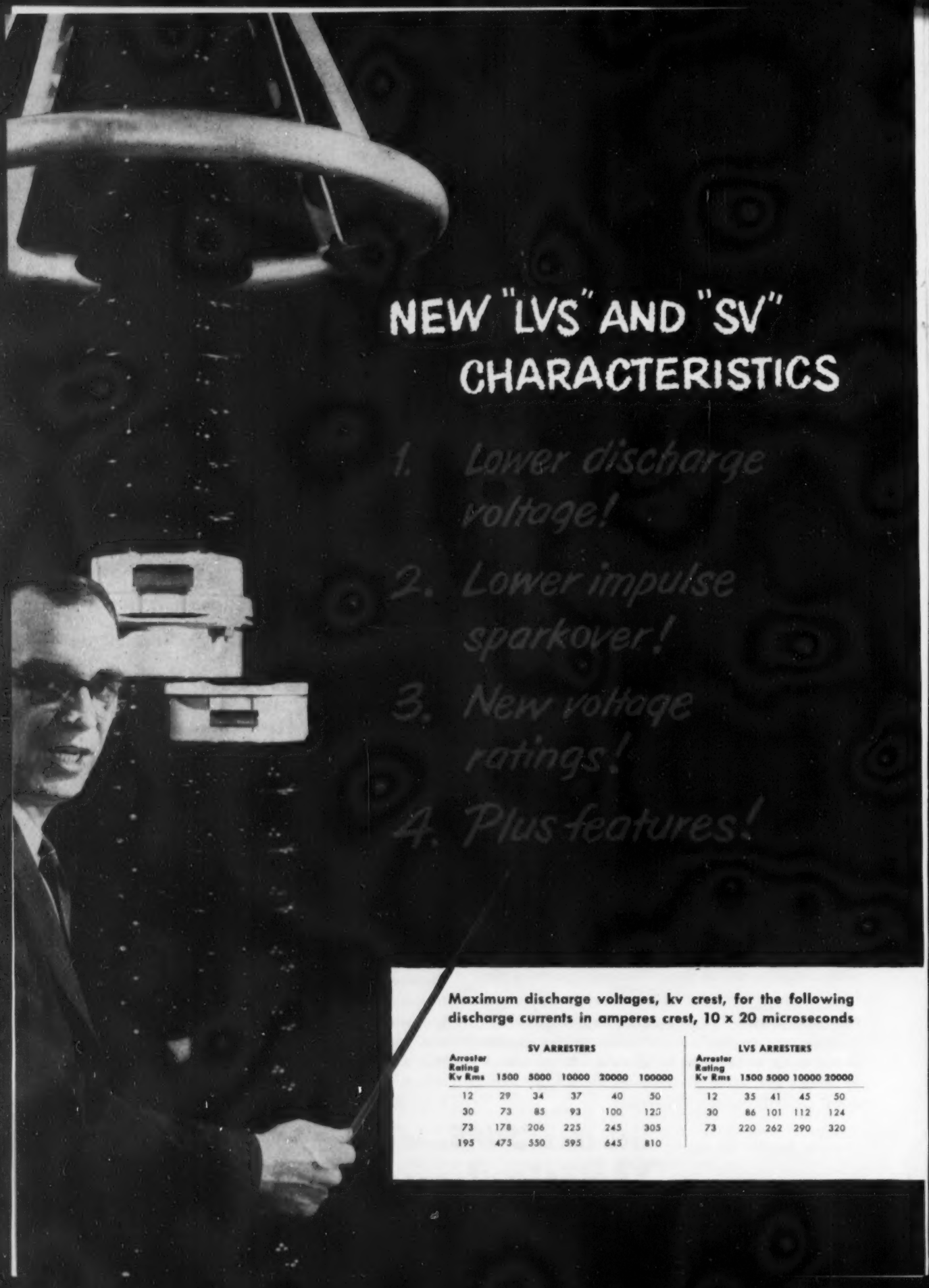
No gas loss—This switch may be operated like a conventional disconnecting switch. When the main blade is raised, the current is carried through the interrupter. The blade engages an arm on the interrupter unit which trips a toggle and snaps open the contacts. The interrupter is hermetically-sealed and no gas is consumed during operation, nor does it deteriorate.

Thoroughly tested—Exhaustive laboratory tests of the VLB show that it is a NEMA Class A device and will operate 500 times without maintenance. Field tests have confirmed laboratory findings.

Replaces air switches—The new switch is available in ratings from 7.5 to 115 kv (138 kv effectively grounded). It can replace existing air switches. Write now for descriptive information on this new device that makes an air break switch do what you have always wanted. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60847

YOU CAN BE SURE...IF IT'S

Westinghouse



Maximum discharge voltages, kv crest, for the following discharge currents in amperes crest, 10 x 20 microseconds

SV ARRESTERS					
Arrester Rating Kv Rms	1500	5000	10000	20000	100000
12	29	34	37	40	50
30	73	85	93	100	125
73	178	206	225	245	305
195	475	550	595	645	810

LVS ARRESTERS				
Arrester Rating Kv Rms	1500	5000	10000	20000
12	35	41	45	50
30	86	101	112	124
73	220	262	290	320

Westinghouse station and line arresters now provide more protection than ever

Proved reliable by over 14 years of trouble-free experience, Westinghouse SV (Station Type) and LVS (Line Type) Lightning Arresters now offer you even greater protection—*while retaining all basic design features!*

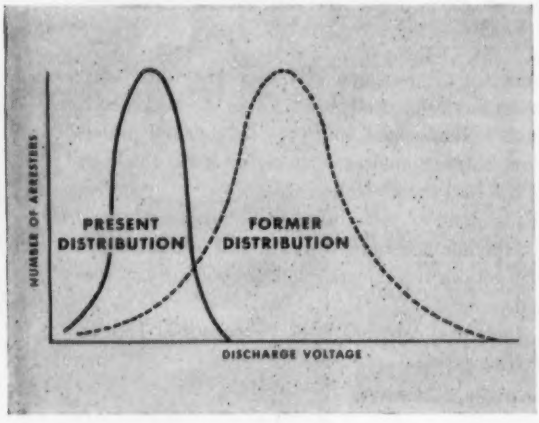
Maximum Discharge Voltages have been lowered (see table opposite) to give you the greatest protective margins available in high-quality arresters. This was achieved through improved manufacturing processes of Autovalve® blocks, made possible by higher quality silicon carbide (see curves below).

Impulse Sparkover Values for the LVS have been reduced *without reducing the 60-cycle sparkover.* You are assured of protection and a safe margin for clearing power follow current only through proper balancing of these two sparkover values.

5 New LVS Ratings—3, 6, 9, 12 and 15 kv—have been added to meet the demand for this widely accepted arrester in ratings below 20 kv. Porcelain tops allow closer mounting where space counts.

Plus Features of the Westinghouse design give you many additional benefits. Exclusive solder seal solves the moisture problem. Separately sealed gap assembly—an SV exclusive—keeps out moisture. Aluminum alloy end castings eliminate maintenance. New LVS pressure relief diaphragm relieves severe gas pressures in event of failure. LVS surge capacity of 100,000 amperes is well above minimum industry standards.

Reliability Is Everything in an arrester. That's why you can't ignore the Westinghouse performance record—why you can't afford to take a chance on unproved arrester designs. So be sure—order Westinghouse SV and LVS Arresters and get the best protection you can buy. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60862



The above curves show the comparison of former and present distribution of the discharge voltages on Autovalve lightning arrester production. Note how the limits of discharge voltages have been reduced, resulting in lower characteristics throughout.

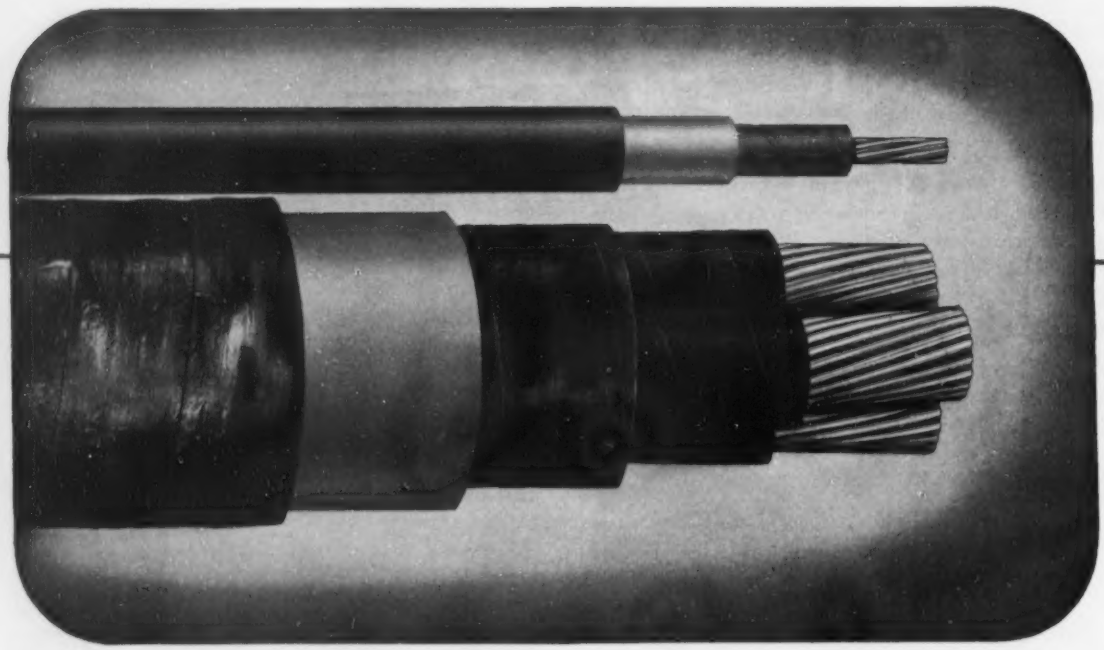
All Autovalve arrester blocks are tested in this revolving table. They are connected in series with gaps shown in the upper compartments. In this exclusive Westinghouse operating test, each block is subjected to two long-tailed surges superimposed on 60-cycle voltage.

YOU CAN BE SURE...IF IT'S

Westinghouse

ROEBLING PROTECTIVE COVERINGS ON LEAD SHEATHED CABLE

for utilities, chemical plants and the petroleum industry



LEAD SHEATHED CABLES used in certain applications by public and private utilities, chemical plants and the petroleum industry are often impaired by electrolysis or chemical corrosion. But such corrosive action can be effectively reduced, and cable life extended, by using Roebling Paper Insulated and Varnished Cambric Cables with either of two outer protective coverings.

One of these coverings is an extruded thermoplastic sheath employing a special high-molecular weight polyethylene. The other is ROESHEATH, built up of neoprene and neoprene-filled fabric tapes and vulcanized directly over the lead sheath. Both coverings not only provide essential protection, but, in some cases, may permit the thickness of the lead sheath to be reduced.

For longer, more dependable cable life and worthwhile economy write for full information... and get our recommendations for solving any special problem.

John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

A subsidiary of The Colorado Fuel and Iron Corporation

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CF&I

NEES Names Coleman a VP

New England Electric System advances veteran employee from presidential aide's post to vice president

ALFRED V. COLEMAN

Alfred V. Coleman, assistant to the president of New England Electric System and vice president of several subsidiaries, has been promoted to vice president of the holding company. Coleman, who entered the utility field in 1915, is being replaced by R. Leigh FitzGerald.

After graduating from Massachusetts Institute of Technology in 1915, Coleman joined Union Electric Light & Power, a NEES subsidiary, as an engineer. Since then he has filled various administrative and executive posts for NEES operating companies, including utilities at Weymouth, Quincy, and Wareham, Mass., and Lebanon, N. H. He has been serving as vice president of Quincy Electric Light & Power Co, Weymouth Light & Power Co, and Granite State Electric Co, Lebanon.

Coleman's appointment as assistant to the president of NEES was made in August, 1950.

Benda Made Chief Engineer

HAROLD W. BENDA

Harold W. Benda, superintendent of production and operation for Iowa Southern Utilities Co, Centerville, Iowa, has been appointed to the newly created position of chief engineer. In his new post, Benda will be responsible for all engineering in connection with the utility's gas, electric, and steam heat properties.

Benda's employment with Iowa Southern Utilities started in 1922 when he went to work for the company's Centerville Service Department. In 1925 he was placed in charge of electrical equipment in generating stations, and substation construction and maintenance. During the next several years he worked throughout the company's entire property, supervising its generating station and substation additions.

He was promoted to electrical equipment maintenance engineer in 1945 and four years later was named chief operations engineer in charge of operating the utility's network of high voltage transmission lines. When he was appointed superintendent of production and operation in 1952, he assumed responsibility for power production, system operation and system planning a post he filled until his recent appointment.

Stone & Webster Names Hartridge, Kosters VP's

Stone & Webster Engineering Corp has elected Alfred L. Hartridge and Stuart F. Kosters as vice presidents. In a treasury appointment, the corporation appointed Thomas W. Barry as assistant treasurer.

Hartridge, who divides his time between the corporation's New York and Boston offices, joined Stone & Webster in 1931. Since then he has served in various capacities, including personnel manager and treasurer. Hartridge will continue to serve as treasurer.

Kosters will continue to serve Stone & Webster as appraisal manager as well as vice president. After service with the U. S. Army and many years of engineering, construction, and appraisal experience, he joined Stone & Webster in 1930.

Barry, chief accountant of the firm since last August, has served for the past 26 years in many key accounting capacities for companies for which Stone & Webster Service Corp has been a sponsor.

•

Virgil H. Disney has been promoted to manager of the electrical engineering research department of Armour Research Foundation of the Illinois Institute of Technology, Chicago. Disney, who joined the Foundation staff in 1949, was made assistant manager of the electrical engineering department in 1951.

L. A. Wiedman, manager of Oklahoma Gas & Electric Co's Norman district since 1936, has been named manager of the company's Northern Division at Enid to replace **E. B. Smith,** who has retired after nearly 40 years in the utility field. Wiedman, who joined OG&E in 1920, will be succeeded as district manager by **J. L. Farmer,** street lighting engineer for the utility's general office.

James O. Johnson has been named general sales manager of Buchanan Electrical Products Corp, Hillside, N. J. Johnson, an electrical engineer, became associated with Buchanan in 1946 as assistant general manager.

C. L. PETERSON

Peterson Made a VP of a Honeywell Division

C. L. Peterson, general sales manager of the Brown Instrument Division of Minneapolis-Honeywell Regulator Co, has been elected vice president of that division. In another divisional appointment, O. B. Wilson was made general sales manager to succeed Peterson.

Peterson will devote the major part of his time to sales policy matters and long-range planning. In addition, he will assist the president of the division in carrying out managerial duties at the policy-making level.

Wilson, formerly industrial instruments sales manager, will assume active administration of the entire divisional sales department.

The new divisional vice president is an engineering graduate of the University of California. He joined the company in 1927 as sales engineer in the San Francisco office. In 1945 he was appointed regional manager for the Pacific region. In 1950 he was named regional manager for Honeywell's Midwest region in Chicago, a post he held until moving to Philadelphia as general sales manager two years later.

Since joining Honeywell in 1923, Wilson has served as industrial manager in Chicago, New York, and other offices.

In 1948 Wilson was named industrial manager for the eastern sales region, becoming field sales manager four years later.

He has served the company as industrial instruments sales manager since January, 1953.

George G. Halfinger, assistant superintendent of Connecticut Light & Power Co's Montville (Conn.) plant, has been named manager of Ohio Valley Electric Corp's Kyger Creek Plant at Cheshire, Ohio. Halfinger, who began with Connecticut L&P in 1932, assumed the Montville Plant post in 1946.

K. C. Christensen, treasurer of Pacific Gas & Electric Co, has been elected a director of the utility's board to fill the vacancy caused by the death of Norman B. Livermore.

Roger H. Bolin has been named manager of general advertising for Westinghouse Electric Corp to succeed Harry J. Deines, who has accepted a position as vice president of J. Walter Thompson, New York advertising agency. Bolin, an electrical engineer, has served since 1949 as assistant to the vice president and general manager in charge of Westinghouse's consumer products divisions.

Lawrence M. Robertson, chief electrical engineer for Public Service Co of Colorado, has been voted the Gold Medal Award for "distinguished engineering service" by the Colorado Engineering Council. It is the sixth award voted by the council in the past 35 years.

Frederick C. Loweth, consulting engineer for Cleveland Electric Illuminating Co, has retired after more than 32 years' service. He served as director of fuel purchase and building construction for a number of years prior to his appointment in the spring of 1953 as consulting engineer.

Cushman Is Utah P&L's New Commercial Manager

J. E. Cushman has been appointed commercial manager of Utah Power & Light Co. Cushman, formerly assistant to the vice president, will now head Utah P&L's division operations and the rate and business development departments.

A native of Salt Lake City, Cushman joined the utility in 1912. After serving as grcundman and lineman, he was made Midvale (Utah) district representative in 1923. He was named division superintendent of lines and service crews at Rexburg, Idaho, in 1929, and took over the same duties at Ogden, Utah, ten years later. He was appointed Rexburg Division manager in 1941 and Preston (Idaho) Division manager in 1945.

J. E. CUSHMAN

Cushman has served as assistant to the vice president since November, 1952, at Salt Lake City.

OBITUARY

Albert W. Gray, 79, a construction engineer who directed hydroelectric projects in New England, Washington, Georgia, Alabama, and Colorado, died at Hartford, Conn., March 1. Most recently he was assistant to the president of Hartford Electric Light Co. His utility career started at the turn of the century when he served as construction manager of Colorado Power Co. Later he was superintendent of construction for Stone & Webster Engineering Corp.

E. T. Wilson, Jr, 48, sales representative of the Tubular Products Division of Babcock & Wilcox Co in the Pacific Northwest and western Canada, died Feb. 24 at Portland, Ore.

Jack A. Clay, Sr, 77, former vice president and general manager of Western Colorado Power Co, died Feb. 25 at Pasadena, Calif. Clay joined Western Colorado Power at Durango, Colo., in 1910 and was elected a vice president and served as general manager until 1936. He transferred then to Utah Power & Light Co, parent of Western Colorado Power. He remained with that company until his retirement in 1946.

Continuous glazing machines like this give Victor insulators an even coat of uniform thickness.

Another Reason Why—

VICTOR Makes Better Insulators

WE USE AUTOMATIC GLAZING MACHINES

PERFECTION of glaze makes an insulator self-cleaning, gives it higher mechanical strength and greater resistance to thermal variations.

By designing and building its own automatic machines, Victor gives you this glazing perfection. Each insulator is thoroughly and evenly coated with glaze. Timing is accurately controlled for maximum penetration at the interface of the insulator body and the glaze.

That's why Victor gives you smooth, perfectly glazed insulators that stand up under the most severe conditions of service . . . that cut maintenance and replacement costs to a minimum. For the full story, send for our free booklet, "The Story of Victor and Purified Porcelain."

VICTOR NO. 900 SUSPENSION INSULATOR

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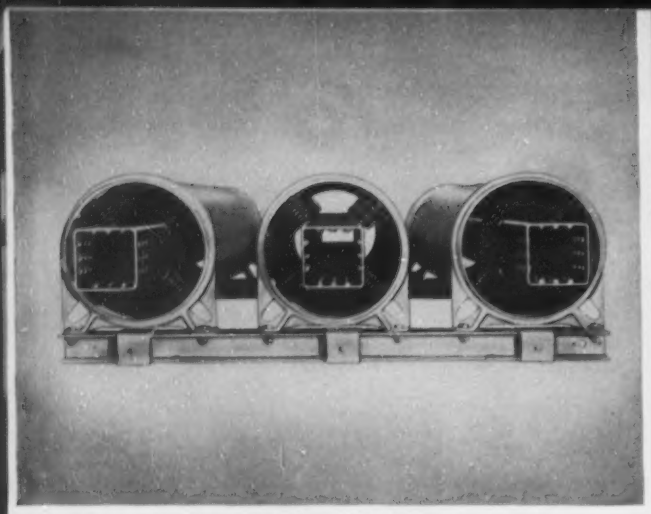
VICTOR PURIFIED PORCELAIN INSULATORS

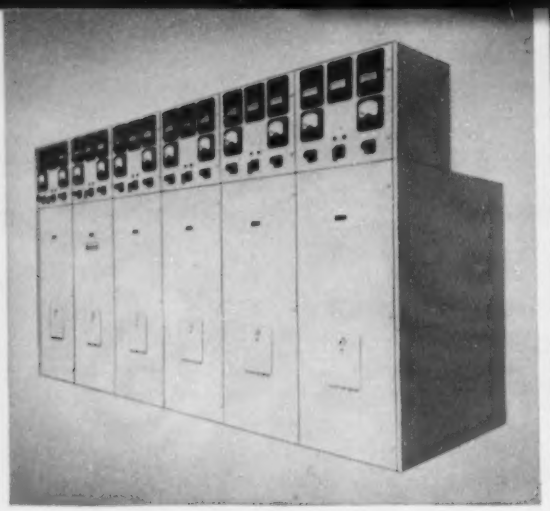
VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators

• Custom Designed Porcelain • Insulator Hardware

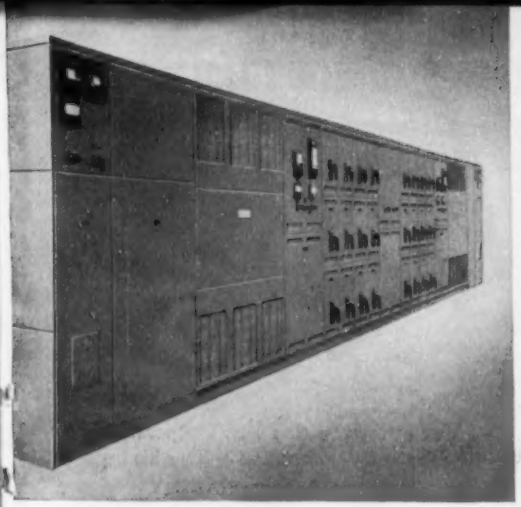


METAL-ENCLOSED BUS STRUCTURES

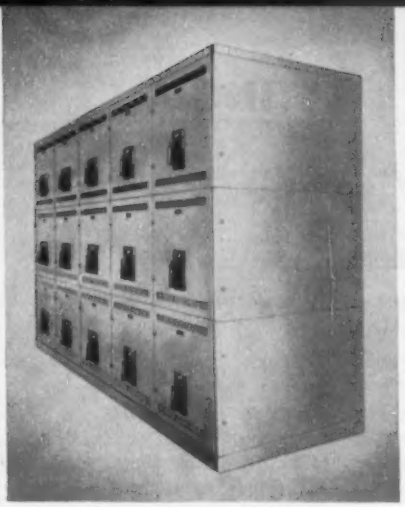


METAL-CLAD SWITCHGEAR

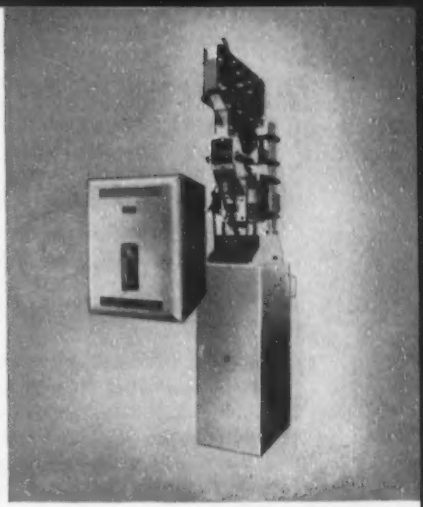
Put I-T-E



UNIT SUBSTATIONS



LOW-VOLTAGE SWITCHGEAR



LARGE AIR CIRCUIT BREAKERS

in your power plans...

for Dependability, Safety, and Over-all Economy

A complete line of Quality Switchgear Equipment

From generation to utilization, I-T-E quality equipment serves every industrial and commercial application. Whether your plans include bus structures, metal-clad or low-voltage switchgear, unit substations, or individual circuit breakers—you are assured of I-T-E's many *extra-service* benefits, which include:

1. selection and application of equipment
2. preparation of specifications
3. coordination of all job requirements

Power is fundamental in any new plant construction or expansion. Power distribution systems must be planned to assure maximum dependability of service, safety for personnel and equipment, and *over-all* economy—from initial planning . . . through the life of the equipment.

Furthermore, it is important to plan power systems with an eye to the future. They should be adaptable to changing plant requirements for many years ahead.

For these reasons, it pays to include I-T-E quality products in your power plans. For over 65 years I-T-E has set the standard for the industry—through engineering skill, design refinement, and introduction of new ideas and thinking.

For details, contact the I-T-E field office nearest you. Look in your classified telephone directory under "Electrical Equipment."

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I-T-E CIRCUIT BREAKER COMPANY

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SWITCHGEAR PRODUCTS

'54 Key to Wiring Promotion . . .

. . . Walker Cisler tells National Adequate Wiring Conference. Detroit Edison president sees this year as turning point

The year 1954 will mark the turning point in electric industry's efforts to reach the goal in adequate wiring promotional activities. This was forecast by Walker L. Cisler, president, Detroit Edison Co, keynote speaker at the tenth annual National Adequate Wiring Conference. It was partially proved by the record attendance of close to 300, the program, and the outward enthusiasm of the conferees. The conference was held, Feb. 25-26, at Chicago.

Under the chairmanship of Lester F. Barrett, chairman, Planning Committee, National Adequate Wiring Bureau, the conference covered all of the major activities leading to the solution of this continuing industry problem — inadequate wiring. Emphasis was placed upon the essential part to be played by utilities, manufacturers, distributors, retailers, contractors, home builders, residential appraisers, and lending institutions.

All Groups Stand to Gain . . . The relative interests of various industry groups was well illustrated by Cisler when he pointed out the costs and revenue involved in the installation of six room-style air conditioners in a 30-year-old office building. The conditioners retailed at $2,060, wiring costs were $688, and annual revenue for the utility was $78.

Over the next 20 years he estimated 7,000-billion ft of wire would have to be installed to bring energy to electrical equipment which will be added.

Stop Kidding the Public . . . In outlining a new approach to the adequate wiring problem, Merrill E. Skinner, vice president and director of sales, Union Electric Co of Missouri, laid down several principles. He challenged the use of the phrase "adequate wiring." He said, "Let's stop kidding the public into thinking they can provide a wiring system that is adequate. If it should be adequate today, it won't be tomorrow." He suggested some new slogans to substitute for "adequate wiring" such as: "Planned Wiring for Electrical Living," "Wired to Serve Well," "Wired for Growth," or "Wired for Modern Living—Electrical, of Course."

For the utility, Skinner suggested that three things be done constantly, actively, and intently:

1. "When you sell an appliance, sell the wiring with it.

2. "When you have sold an appliance and the wiring, try to sell the wiring for the next appliances the customer will want.

3. "Get out and sell wiring at all times."

An example of utility activities in Cincinnati was presented by Frank E. Wiatt, assistant manager, Electric Sales Department, Cincinnati Gas & Electric Co. Its new program, (EW, Feb. 22, p 146) which has now been in operation for four months, provides for the purchase by the company of the customer's note to the contractor covering the cost of wiring. The customer's credit is checked, and, if approved, he is billed monthly by the utility for from one to three years.

Average Job $222 . . . At the end of the first four months Cincinnati G&E had accepted 159 jobs from 77 contractors valued at $35,578. Those taking 12 months to pay represented 16% of the jobs and 12% of the money involved. Those taking 24 months represented 26% of the jobs and 21% of the money. Those taking 36 months represented 58% of the jobs and 67% of the money. Average job ran $222.

Contractor the Key . . . Cooperating with the contractor and getting his interest in adequate wiring still offers many opportunities according to Harry De Poy, manager, Central Wisconsin Adequate Wiring Bureau. He described the bureau's plan of providing wiring layouts and personnel to sell adequate wiring to the contractor's customers.

The use of service trucks to handle wiring jobs of a contractor has helped Alber Electric Co, a Kansas City contractor, keep down the cost of wiring and increase business.

Farm Wiring Inadequate . . . A panel discussion under the chairmanship of H. H. Watson, Construction Materials Division of General Electric Co, pointed out the huge problems in farm wiring. Watson estimated a wiring modernization market of $2 billion for 5 million wired farms. This, he said, was almost as much as the wiring needs of the remaining wired homes in the country. Watson also emphasized responsibility of the contractor in seeing that the wiring modernization job gets done.

WALKER L. CISLER

1954 will be the turning point

MERRILL E. SKINNER

Quit kidding the public

SPEAKER C. T. Sinclair, Duquesne Light Co vice president, admonishes his audience to train young engineers for promotion to management responsibilities. Listening intently are B. R. Nevins, Philadelphia Electric Co; and W. C. Bryson, chairman of PEA's Engineering Section

Management Training Urged . . .

. . . for young engineers. Sinclair tells PEA Electrical Engineering Committee utilities should supply this education

Closer attention to the education and professional development of young engineers was urged by C. T. Sinclair, vice president, Duquesne Light Co, at the winter meeting of the Pennsylvania Electric Association Electrical Equipment Committee at Pittsburgh Feb. 25-26.

Job for Utilities . . . Colleges do not emphasize management training which their graduates need in the light and power industry, he said. Declaring that the remedy rests with the utilities, Sinclair said they should approach candidates at high school age and supplement their college education by providing instructive summer employment.

Sinclair inferred that utilities are not without fault. He said they have failed to offer competitive wages and to present the desirable features of a utility career in proper relationship to those in electronics or electrical manufacturing. Reluctance to assign responsibility to young engineers and to show interest in their development are additional complaints, he added.

Engineering Section Chairman W. C. Bryson reiterated the need to attract capable employees and to train them for advancement. Important also, he said, is continued improvement in electric service to customers at reasonable cost. Investigations are in progress to determine how this committee activity may be featured at the coming annual meeting.

Low-Cost Grounding . . . Economy in station grounding can be achieved with an all-steel network, Glen Appleman, Pennsylvania Power & Light Co, said. Grounding resistances are low, cathodic protection easy, and material cost cut up to 50%. Complete elimination of dissimilar metals below ground cuts galvanic attack on buried pipes and conduits, cables, and all other sub-surface metal. And sacrifice drain anodes can be cheap scrap iron or steel, Appleman stated.

New Discoveries . . . Research provides the knowledge needed to develop new materials and new designs, said E. X. Hallenberg, Westinghouse Electric Corp. One example of basic research which has paid off in a commercial design, he said, is Bell Laboratories' transistor. Another discovery with good commercial prospects, he said, is cooling transformers by fluorocarbons sprayed directly onto hot windings. The liquid absorbs heat in vaporizing, condenses in a heat exchanger, and drops into the tank whence it started. Transformer is cut in size and weight, and has the added virtue of protection against fire and explosion.

Problem for the future is superconductivity. Hallenberg cited cryogenic research in which the resistance of pure lead dropped so low that a small ring carried 8,000 amp for months without measurable loss. Impediment to application is that superconductivity occurs today only below −440 F. In that zone copper serves to insulate superconductive alloys, he said. Hallenberg would not predict when an atmospheric-temperature superconductor will be discovered, but its obvious advantages stimulated much comment.

POWER BRIEFS

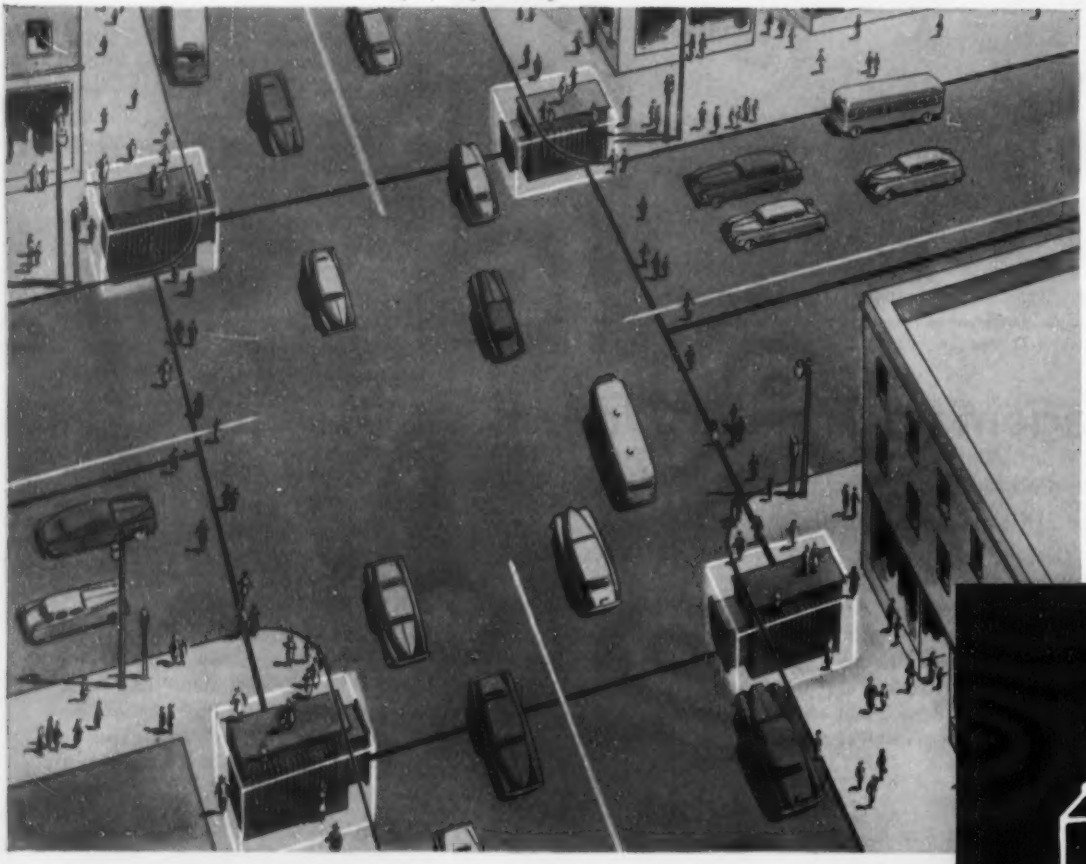
● General Electric Co's Test Program will no longer be known as the Test Program. Its name has been legally changed to the Engineering Program.

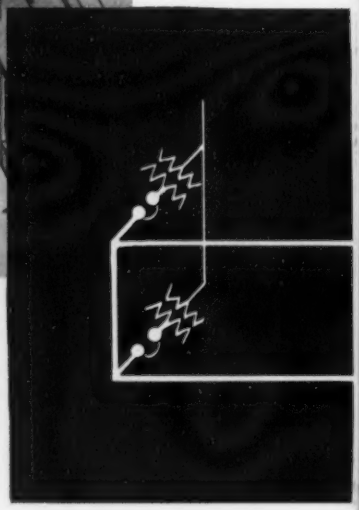
● Florida Power Corp has broken ground for a $11-million addition to its George E. Turner Plant at Enterprise, Fla. The 70,000-kw addition will boost plant's capacity to 111,000 kw. Completion of the new unit is set for October, 1955.

● Expansion work on the Dan River plant near Draper in Rockingham County, N. C., has been started by Duke Power Co. The new, 150,000-kw unit is expected to increase the plant's capacity to 300,000 kw. The project, slated to be completed by August, 1955, is estimated to cost between $15 and $20 million.

● Nebraska Public Power System has announced plans to construct a new 70,000-kw steam generating station together with necessary transmission facilities.

PREVENTING TRAFFIC





Moloney Network Transformers are available in all E.E.I.-NEMA standard Kva and voltage ratings with standard and optional mechanical features.

MOLONEY

Manufacturers of Power Transformers • Distribu

SALES OFFICES IN ALL PRINCI

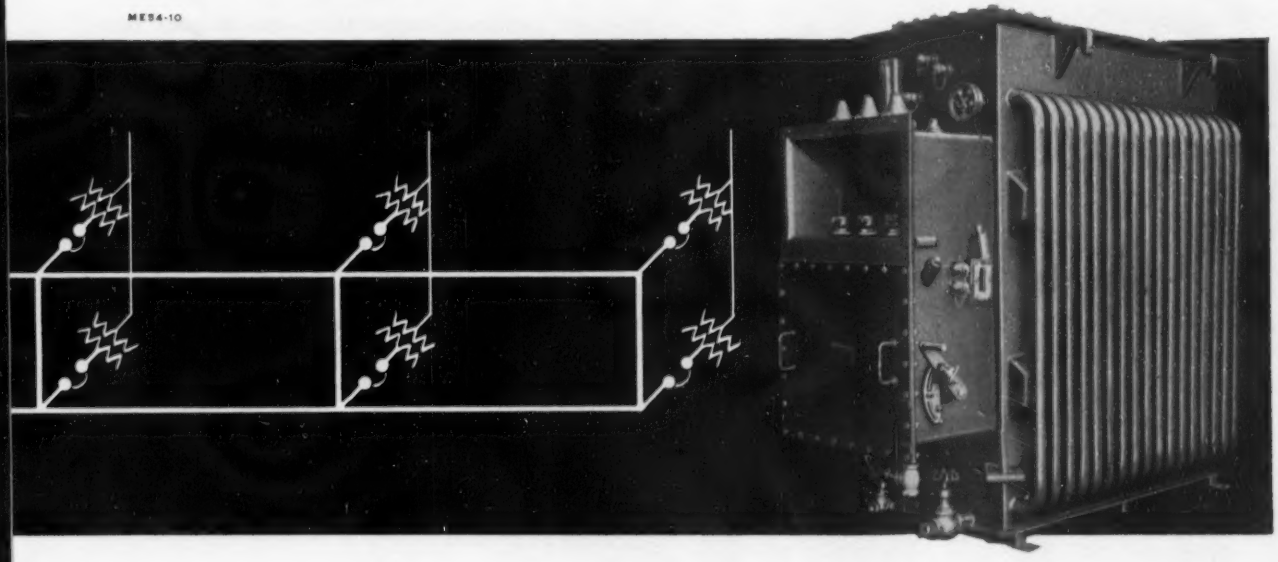
JAMS UNDER THE STREET

Your network system resembles, to an astonishing degree, the very streets under which it lies, and your network transformers have much the same job as the traffic cop in keeping the kilowatts constantly moving along your lines to the customers. But these transformer "traffic cops" work all around the clock without relief. They must safely handle the fluctuations in daily load . . and must be ready to meet and handle the ever increasing demands of your customers.

For, if a network transformer falls down on the job, if the traffic is more than it can handle, the resulting failure throws added burden on the rest of the network . . . may cause a serious traffic jam of kilowatts that cuts service to customers, costs considerably to repair.

That is why you specify equipment upon which you can rely. Moloney Network Transformers enjoy the same high reputation of all Moloney equipment . . . they combine all the engineering, design, and fabricating experience which is the mark of Moloney, a firm which has specialized in the manufacture of better transformers to meet utilities problems for 58 years.

ME54-10



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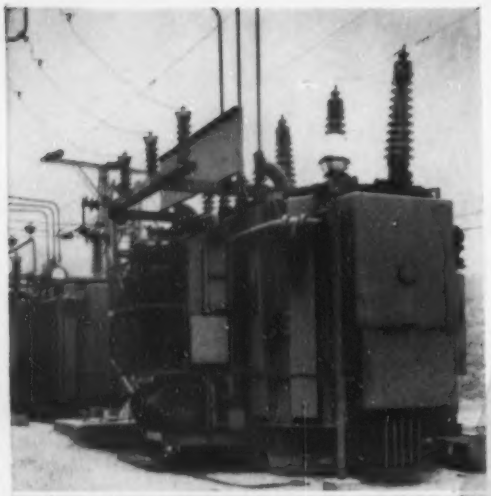
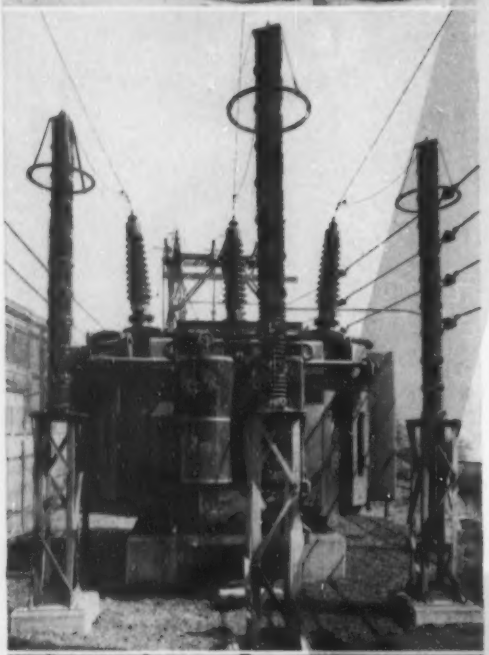
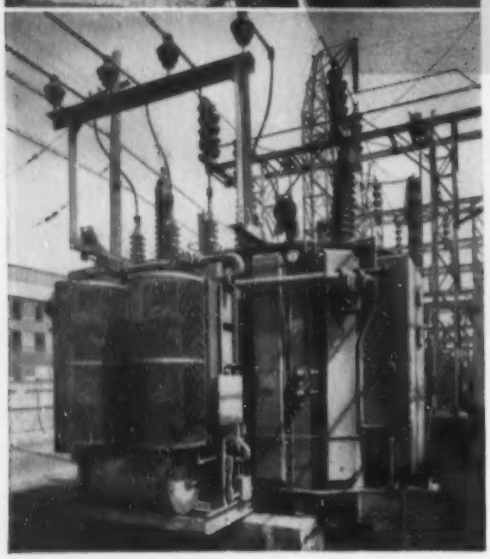






...Four 30,000 kva PENNSYLVANIA TRANSFORMERS

supply the power requirements of the Brackenridge plant of ALLEGHENY LUDLUM STEEL CORPORATION

Each of these transformers is rated at 30,000 Kva, 3 Phase, Oil-Immersed, Forced-Oil-Cooled. Together, the four transformers supply 120,000 Kva of power to the Brackenridge Plant. But as usual, there is more to the story than the rating of the transformers.

Here are four transformers that were designed to rigid height limitations so they could be delivered by trailer truck to their installation sites. The voltage — 132 Kv — called for intricate engineering and strict attention to mechanical detail.

The first unit to be installed at Brackenridge illustrates how carefully the design was worked out. The transformer was trucked over 44 miles of first and second class highway and rolled off the trailer onto its foundation — all in one day. To reach Brackenridge, each transformer had to be light enough to go over bridges, small enough to go under viaducts, and properly distributed in weight to negotiate sharp curves with safety.

For a better picture of how this was done, we invite you to write us on your letterhead to arrange for a showing of our 16mm. black and white movie entitled "30,000 Kva En Route."

Pennsylvania Transformer Company

A McGraw Electric Company Division • **Canonsburg, Pa.**

GREATER PITTSBURGH DISTRICT

What Operators Should Know About . . .

Capacitor Switching in Low Ambients

F. G. STEBBINS and R. J. HOPKINS
Capacitor Department, General Electric Co, Hudson Falls, N. Y.

Utilities operating in the northernmost states and in mountainous regions need capacitor banks that can be switched "off" and "on" at below zero temperatures without causing capacitor failures. Capacitors with low-temperature askarel present no such seasonal problem.

Service experience with switching standard-askarel filled power-factor capacitors in sub-zero weather has served warning that capacitors may break down under these conditions. Extreme cold contracts and solidifies standard askarel resulting in voids. Corona, low insulation strength, and subsequent early failure of the capacitor are the probable result.

On the other hand, low-temperature askarel does not solidify and form voids, and no low-temperature limit has to be placed on switching capacitors containing it in the continental U. S. Nor has low-temperature askarel a high temperature limitation, being just as suitable in warm weather as the standard dielectric synthetic.

Many thousands of capacitors were supplied as long ago as 1948 with low-temperature askarel for locations where switching is done at temperatures below O F. So far as is known, no failures have occurred that can be attributed to cold-weather switching of any of these units.

Need for low-temperature askarel came to the attention of operators when they found that power-factor capacitors filled with the usual compound could not be switched indiscriminately during sub-zero periods. Switching was followed by a marked increase in the failure rate of the capacitors. This failure rate approached 1% per switching cycle.

Investigation developed that the capacitors did not fail because of any defect in material or manufacture. Long thin columns of standard askarel, inherent in capacitors, were susceptible to forming voids during extreme cold. Capacitor failures followed energizing of the unit after it had been off voltage for two or more hours. When continuously energized, it revealed no low-temperature limit.

When the low-temperature switching limitations of standard askarel were recognized, a special askarel was developed and made available. Capacitor units are now of two classes, those having standard and those using the new low-temperature compound.

Acceptable Expedients . . . Many operators in areas subject to sub-zero conditions have standard askarel capacitor banks in use today. Where practicable, these capacitors should be transferred to locations where they can be left on the line continuously during cold weather. Low-temperature askarel units should be installed where switching is necessary. Where banks of standard askarel capacitors must be switched "on" and "off" in temperatures below O F, several expedients are available to the operator.

1. Such installations should be re-energized periodically to keep them warm. Allowable time "off-voltage" for capacitors in open racks or hangers at various ambient temperatures follows:

Ambient-Degrees-F.	*Allowable Hours Off Voltage*
0	6
—10	4½
—20	3½
—30	3
—40	2½
—50	2

2. When capacitors have been off-voltage no longer than the times given, they should be put back on voltage for at least 45 min. They can then be de-energized for the times in the

AUTO-SWITCH CAPACITOR equipments, each rated 180 kvar, 4,160 v, shown above in a severe winter setting, require low-temperature provisions to avoid switch-on capacitor failures

OPEN BANKS, such as this 500-kvar installment of 2,400-v, 15-kvar capacitors which is manually switched, withstand any winter conditions when equipped with low-temperature askarel

table. Case temperature is not an indication of internal temperature. Capacitors in metal-enclosed housings can probably remain off voltage longer but when off voltage for more than 12 hr will follow changes in ambient temperature closely.

3. Thermostatically controlled electric heaters may be used between switching cycles to keep the temperature of enclosed or housed capacitors above the danger point. Ventilation louvers of the capacitor equipment should be covered. Supplementary heating is not feasible for the open-type capacitor bank.

4. Of course, capacitors can be switched in low temperatures on a calculated risk basis. Experience indicates that all standard-askarel capacitors are susceptible to low-temperature switching failures. When a capacitor bank cannot be cycled or heated externally, it may still be switched if the operator accepts the probability that for each low-temperature switching operation failures may be as high as 1% of the total capacitors involved.

Development of Limitations . . . An unusual number of casualties during cold weather switching was first noted by a utility operating in northern New England. This operator had installed about 410 switched capacitors, about 330 of which were in 180-kvar outdoor auto-switch style housings and the remainder in open banks on pole structures.

In general, the switching was done manually. The capacitors were switched off at 5 PM and on again at 8 AM. The first winter was unusually severe, with 40 days of sub-zero temperature and 14 days with temperatures below −15F. The lowest temperature was −28F.

Early that winter station operators noted that failures occurred when the banks were switched on or shortly thereafter on cold mornings. They recorded daily minimum temperatures, dates, and locations of capacitor failures.

Operators found that by the end of the winter 45 capacitors, about 11% of the capacitors switched, had failed for causes other than manufacturing defects. Most failures occurred on mornings when the lowest temperature was −15F or lower.

Laboratory Investigations . . . Subsequent corona-starting voltage measurements in the laboratory on capacitor elements representative of full-sized power capacitors showed that dielectrics impregnated with standard askarels exhibited a marked reduction in corona-starting voltage when cooled below −20F. Apparently, this reduction was due to cracks or voids formed in the long, thin columns of liquid present in every capacitor.

Corona-Starting Voltage . . . Significantly, these tests indicated that the corona-starting voltage did not recover from its low-temperature value until the temperature of the dielectric reached the flow point of the liquid. This meant that voids formed in askarels by low temperature do not heal until the material is again liquified.

Standard askarel liquifies at about 55F.

Low-temperature switching tests on full-sized capacitors indicated that capacitors cooled to −40F. before each switching failed after only a few switching operations. Capacitors cooled to −20 F before each switching withstood many switching operations before failure.

After the laboratory investigation was begun, additional field service information was obtained which confirmed the reports from northern New England.

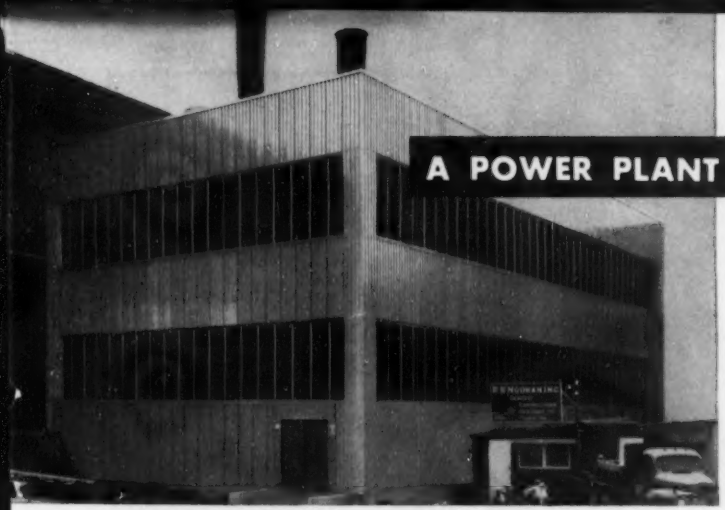
Midwestern Experience . . . A utility in a northern Midwestern state had installed two 1,260-kvar housed equipments. One bank was switched off daily at midnight and on again at 6 AM. The other was switched off at 8 PM and on at 8 AM. In this area the first winter was very severe, in fact the coldest by Weather Bureau records since 1939. Below-zero weather was recorded on 33 days and below −15 F. on nine days . Lowest point was −31F.

By the end of winter eight capacitors had failed in the housing which was de-energized for 12 hours each night. This was 10% of the capacitors in that housing.

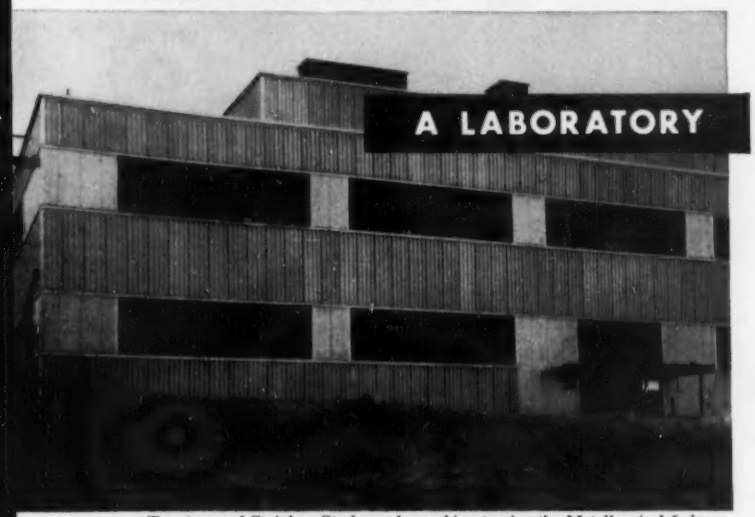
No failures occurred in the housing de-energized for only 6-hour periods each night.

As exact records of dates, failures, and temperatures were not kept by this utility, its reported experience served only to support the New England data.

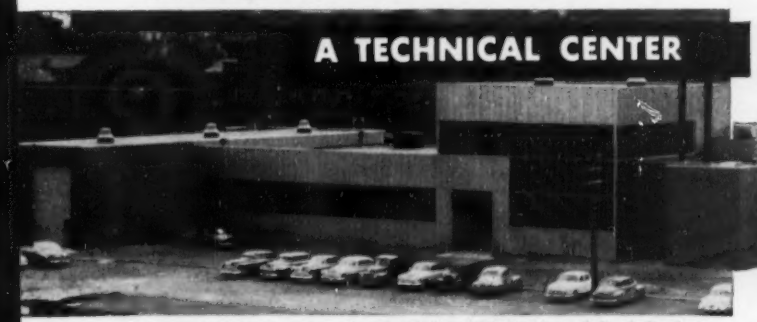
Records and Tests . . . Service records and tests combined to establish a low-temperature switching limit of −15 F (−26 C) for standard askarel. Ca-



Located at Olmsted Air Force Base, Middletown, Pa., this steam generating plant is sided with more than 7,000 square feet of Stainless Steel panels. Architect-Engineer: Gannett, Fleming, Corddry & Carpenter, Harrisburg, Pa. General contractor: R. S. Noonan, Inc., York, Pa.



Two types of Stainless Steel panels combine to give the Metallurgical Laboratory at United States Steel's Fairless Works an attractive exterior. Architect: Hoffman and Crumpton, Pittsburgh, Pa. General contractor: Joseph R. Farrell, Inc., Philadelphia, Pa.



9,000 square feet of wall surface in National Malleable and Steel Castings Company's Technical Center, Cleveland, Ohio, is Stainless Steel. Architects and Engineers: Dalton-Dalton Associates, Cleveland. General contractor: The Leonard H. Krill Company, Inc., Cleveland.

These three buildings went up faster, will stay attractive longer with Stainless Steel panel construction

• Although Stainless Steel was first used as a material of construction more than 25 years ago, its use in the form of insulated panels is a comparatively recent development. But it has been accepted so rapidly that a wide variety of buildings using Stainless Steel panel construction are completed and occupied today.

Here are three structures . . . differing widely in size, in design and in purpose . . . that demonstrate the advantages of Stainless Steel panel construction.

From the standpoint of design, Stainless Steel panel construction offers simple, clean lines with a material that never loses its attractive appearance. Stainless Steel panels can be combined with other materials with pleasing results. And their method of erection—they are hung on the structural framework—allows fullest possible utilization of interior floor space.

Erection is quick and cost-saving. It requires a minimum crew and goes forward in any type of weather.

Once the building is occupied, Stainless Steel panel construction continues to pay off. Maintenance is at a minimum . . . no painting is required. The low thermal conductivity of these insulated panels holds down heating and cooling costs. And the life of the building is long.

If you would like more information on panel construction with USS Stainless Steel, mail the coupon below.

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AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Stainless Steel panels on these buildings fabricated and erected by H. H. Robertson Co., Pittsburgh, Pa.

United States Steel Corporation
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UNITED STATES STEEL

IT WAS A LONG MEETING
–and all we talked about was ash

Yes, gentlemen, we know what you mean. Ash from burning coal is on the agenda of many meetings today —meetings of industrial and utility power-plant operators, air-pollution control boards, and civic-minded groups.

And when you're running a big power plant whose boilers consume many tons of coal every hour, ash disposal becomes a serious problem for discussion. You must talk about the high cost of equipment to trap fly-ash before it leaves the stack . . . the expense of paying for carting away tons and tons of this waste . . . and, of course, how to get the most out of the coals you buy, even if their ash content is high.

These and related problems have plagued industrial and utility power-plant men for years, the more so because they have a keen sense of responsibility for keeping their cities clean, and they are determined to keep operating costs down not only in their own interest but also that of the public.

We would like to make a suggestion. Put B&W's Cyclone Furnace on the agenda for your next meeting . . . and the day you put the Cyclone on your firing aisle you'll start enjoying advantages more and more power-plant men are discussing.

This more efficient method of burning coal converts most of the ash to molten slag, which drains continuously into a water pit for disposal.

If need be, the small amount of fly-ash remaining in the stack gases can be trapped by simple, inexpensive ash collectors and then returned to the Cyclone Furnace to be melted into slag. Result: Elimination of air pollution and of the costly mess of fly-ash disposal.

The Cyclone has many other advantages of interest—increased combustion efficiency, greater fuel flexibility, increased safety, and easier operation.

All this is accomplished—and is being proved in daily service—with *less equipment, less building volume, less manual labor,* and *less maintenance* than is possible when pulverized coal is used. For the Cyclone Furnace is a vast simplification of the entire process of coal preparation, combustion, ash segregation, and ash handling, which brings important savings right down the line.

Selected to fire some of the world's largest and most efficient boilers, Cyclone Furnaces are in operation—under a variety of operating conditions—in different parts of the country. Based on this intensive, long-range experience, we will be pleased to discuss the advantages which the Cyclone Furnace offers.

BABCOCK & WILCOX
BOILER DIVISION

N-164

pacitors treated with a lower pour point askarel were subsequently offered for locations requiring switching at temperatures lower than the limit.

Capacitors with Lower Ratings . . . Factory switching tests on full-sized units indicated that capacitors rated 600 v and below are also susceptible to low temperature switching failure. The differences, if any, between low and high-voltage units were too small to warrant a different temperature limitation.

Experience of one operator confirmed this conclusion. A large North Central industrial firm installed a three-step capacitor bank, consisting of three separate 360-kvar, 480-v housed equipments.

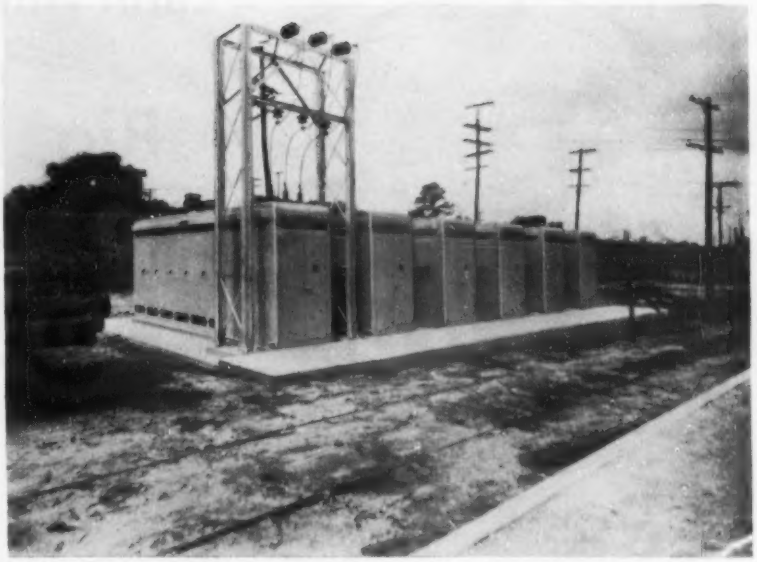
These equipments were automatically switched by kilovar control.

In the second winter, 11 capacitor failures were discovered following a period of −27 F. weather. Most failures occurred in the third-step housing which was de-energized more often and for longer periods than the other two steps.

But operating records were not kept, and inspections for failures were quarterly.

Additional field experience indicated that the low-temperature switching limit set originally was at too low a temperature. Failures were experienced at locations where temperatures did not drop below −15°F.

Typical Experiences . . . Six 2,700-kvar housed equipments were installed by a New England utility in a recent December. That winter had five below-zero days with a low of −13 F. Some equipments were energized each morning about 8 o'clock, except on weekends. Equipments were de-energized throughout the evening as load decreased, the last going off about 10 P. M.



NEW ENGLAND INSTALLATION has six housed equipments, each rated 2,700 kvar, 13,800 v, making a bank of 16,200 kvar automatically switched. For operating experience see story

On cold nights equipments needed on at 8 AM were cycled on and off voltage to keep the capacitors warm. But on several occasions more equipments were energized in the morning than had been cycled during the extreme cold nights. By winter's end six capacitors had failed, most of them in equipment not cycled on bitter cold nights.

One 2,925-kvar high-voltage bank in an open steel framework was installed at another location where for six days the temperature was below 0 F. and on one day below −15 F. The lowest reading was −17 F. This equipment, energized by day and de-energized about 10 PM, experienced only two failures throughout the first winter.

At still another location, two 2,425-kvar high-voltage banks were installed in open steel framework. The first winter, temperatures below 0 F. were recorded on five days, the lowest point being −11 F. These banks, energized early each morning and de-energized in the early evening, had six capacitor failures that winter.

Variation in Switching Limits . . . More failures pointed out that while the previous low-temperature switching limit of −15 F. corresponded very well with laboratory data, there was a fairly wide variation in the switching limits of individual capacitors. New field data indicated a limit near 0 to −4 F was necessary to preclude all failures.

The new limit was confirmed by more than 120 switching tests on full-sized capacitors cooled to a uniform temperature between 0 and −4 F. No failures occurred. A group of three capacitors cooled to −36 F were allowed to come slowly to −2 F. One capacitor failed when it was switched, thus confirming earlier data indicating that a temperature of 55 F. was needed to heal voids caused by the extreme cold.

Reaching Dielectric Temperature . . . The time required to reach a dielectric temperature of 50 F, starting at 0, by energizing the capacitor, was determined to be not more than 45 min. These data provided the information on cycling capacitor equipments to maintain the dielectric temperature above 0 F.

Characteristics of Standard and Low-Temperature Askarel Compared

	Standard	Low-Temperature
Void formation temperature	−25 to −30 F	−78 F
Corona starting voltage	Marked drop at −20 F	No drop to −75 F
Switching tests at −40 F	Failures un 1 to 10 switchings	No failures in 137 switchings

Latin America:

Big, Dark Area Looks to Water For New Power

● Power capacity in all Latin American Countries increased 80% between 1937 and 1952. That looks good, until you note that power use has gone up almost 200% in the same period. Demand is still higher. So—unless some bright plans are enacted to make capacity catch up with demand, Latin America bids fair to becoming a very dark area indeed.

To the American reader, "power shortage" generally means something that is happening somewhere else. He has a vague idea of residential rationing and industries going "down" because there isn't enough of the stuff to make the wheels go round. But what does it mean in a personal way to the man who lives in such an area or tries to run a plant there? For a case history, EW asked Lionel Holmes, McGraw-Hill World News correspondent in São Paulo, Brazil, what it's like to be where there's too little electricity. This is it:

SAO PAULO (McGraw-Hill World News)—The weather takes a conversational back seat in Brazil to two great "faltas"—the shortages of water and power. The man on the street blames the power companies instead of the weather, yet the blame lies largely there. Rainfall since 1950 has been considerably less than normal, reaching severe drought proportions in some areas of the country. Without rain, reservoirs can't fill fast enough to keep ahead of increased demand for water-fed power.

To hold reservoirs above danger low-points, power is rationed, and water supplied to private homes only at uncertain hours of day and night. The resulting situation, discomforting to the Brazilian, would appall the average American who never thinks about his water and power supply.

Blame Spread . . . "The Light", as Brazilian Traction, Light & Power Co is known here, gets a lot of the blame. Other power companies are here, like the American & Foreign Power group, but Light is bigger. And it's The Light that supplies Rio and São Paulo. In São Paulo's hotly contested mayoralty election this spring, winning candidate Janio Quadros got many votes by promising to force The Light to "do something" about the power shortage. He didn't say what.

How are Brazilians being inconvenienced?

Take the elevators. João de Souza waits interminably in a lobby-long line because only one of the four elevators is functioning, "due to the power shortage," the sign says. In some areas of São Paulo, elevators don't run at all at specified hours. If friend João plans a business call at another building he's wise to first phone to learn if that building's elevator is working then.

Worse, sometimes, than no power for elevators is almost enough power. Not infrequently, elevators become overloaded without even a full complement of passengers, and the car comes to a halt between floors.

Not uncommon in São Paulo is a visit to the dentist, after a surge of will power, only to find that Dr. Almeida can't drill your teeth until five o'clock. He has no current until then. At five o'clock you've lost your will power.

São Paulo's winter—mostly July—is cold. Suburban homes get down to 55 F inside, with no heat source other than a fireplace, and most homes don't have that. At the first cold snap everyone buys out the stores' stock of electric heaters, only to find that when most needed there's no power in house or apartment. Or maybe your house has power, but the heaters drink up so much juice that your end-of-month power bill comes with a warnning: "You're over your power quota; on next offense, power will be suspended for eight days."

Rationing is not new. It's been going on in São Paulo since 1950. But now, with reservoirs way down, city officials are getting desperate. In September, 290.2 million kwhr were consumed—just under 5-million more kwhr than the water reserve permits. For going over quotas in September, eleven São Paulo homes and nine factories had their power cut off early in October. In Rio, 30,000 residential consumers have been warned about excess consumption. Even government establishments are cautioned.

Bucking Nature . . . Human nature fights the restrictions. João de Souza

8 cell cooling tower driven by 8 Wagner Multi-speed Motors.

to get more power from steam

This 8 cell Marley Cooling Tower at a steam power plant in Pueblo, Colorado, cools 6600 gallons of water per minute—from 95° F to 80° F, at a wet bulb temperature of 65° F. This constant supply of cooling water lowers steam pressure beyond the turbine to give more kilowatts per lb. of steam.

There are 8 fans with blades 22 feet in diameter, that are driven through gear reducers by 8 Wagner two speed totally-enclosed fan-cooled motors. These 440 volt motors are each rated 75/19 hp.

Cooling towers need motors with plenty of stamina. They must operate without attention, day in and day out, completely exposed to all kinds of weather.

This exacting application is one of many where specialized requirements are met from the complete line of Wagner standard motors.

Whatever your requirements may be—there is a Wagner Motor to fit every need—a complete line for all current specifications, with a wide variety of enclosure types and mountings. Your nearby Wagner engineer can help you select the *right* motors for your needs. Call the nearest of our 32 branch offices, or write us.

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WM53-6

learns that a friend in another section has received a power quota, about half the normal. João expects a similar cut-in-half quota soon, so he doubles his use of power against being cut in half later. There's an extension of the same gimmick: Niteroi (across the bay from Rio) homeowners and apartment dwellers were told to register their electric appliances as a basis for a future setting of power quotas. Resourceful residents registered their refrigerators and radios, and then unabashedly reported nonexistent electric stoves, television sets, toasters, waffle irons, electric broilers, etc—everything, one assumes, but electric blankets. Then, when power quotas were granted, they had at least enough power for legitimate appliances. Some people suffer in this shuffle, the honest ones being left only with enough power to operate their electric pumps.

And electric pumps are a vital adjunct to Rio apartment living. Often, if your apartment house has no pump (they're illegal), you may have no water, because the building next door has a pump tapped onto the water line. Water is siphoned out before it gets to you. Only recourse is to have the apartment-house manager put in a pump, so that everyone siphons equally.

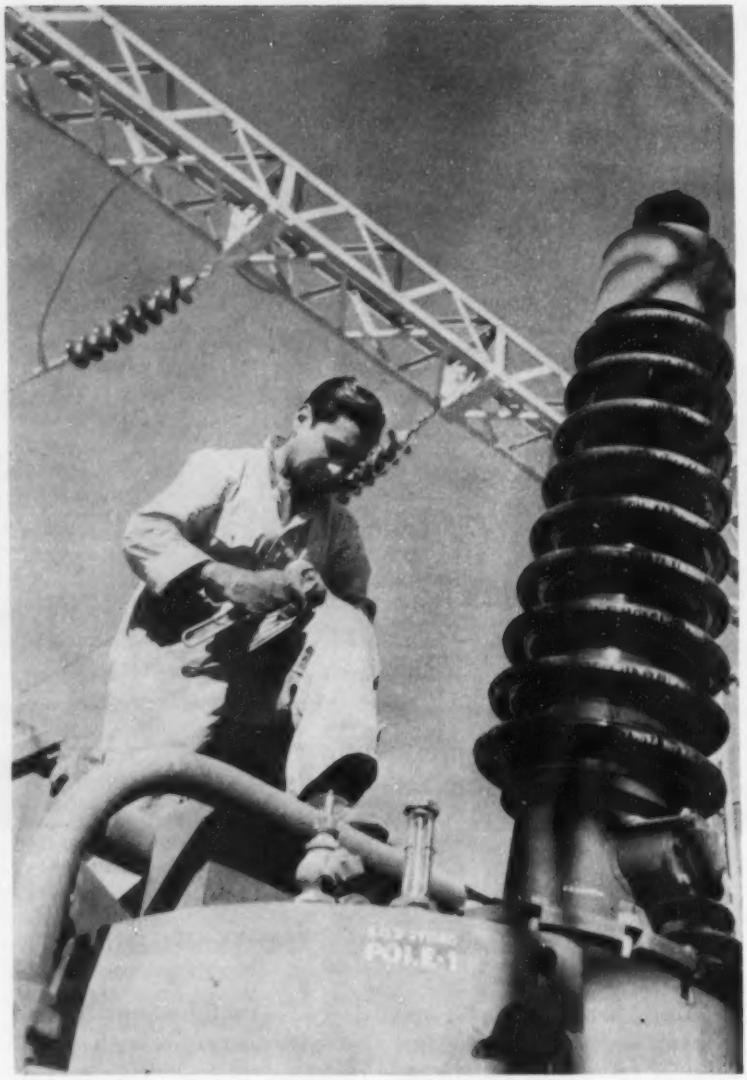
But it's no joke to industry. Factories are working with reduced output, reduced labor, for want of electricity. Power is cut off from many industrial areas noon till five. Some plants not yet seriously affected but expecting to be hit hard soon are working full tilt, using up last reserves of materials, in effect accumulating "power" in the form of industrial goods. Factories are working more night hours than day hours in many cases, with a resultant 20% increased payroll for night labor. Up go production costs, hand in hand with climbing living costs which have been rising 12% per month through 1953.

Plant Snafu . . . Factories have been erected in interior towns without first getting firm guarantees that power will be connected to the plant. So the plant sits idle until the manufacturer convinces officials that his plant is essential.

In desperation, manufacturers have imported diesel generators, mostly from Europe, to fill in the cut-off hours. This is more expensive power and puts a further strain on the country's economy, draining off valuable dollars for imported diesel oil. If the gasoline rationing that's being talked about extends to diesel oil, the man with a brand new generator may find his generator also working only part time.

Aggravating the situation in the recent past have been the occasional breaks in Cubatão power plant generators—always worth a headline in the newspapers. A recent such accident reduced Cubatão power production 20%.

Far from being a passing crisis, the power shortage will be with Brazil for a long time. The situation isn't being helped by the unabated industrial expansion and civic improvements. But improvements and expansion are needed as much as power. Trouble is, power has to come first. L.J.H.



CHILEAN ENGINEER makes an adjustment on 76,000-kw Sauzal hydro plant near Santiago. Country is harnessing streams in its 23,000-ft Andes to cut costs of importing oil for power

Plans Many; Problems Too

Sounds pretty bad. Government officials and power company executives must be under pretty heavy pressure to do something about the shortage.

What is being done today in Latin America to ease the problem was the subject of a recent survey by the United Nations Statistical Office. Here, Jose M. Nicolai of that office tells the story for EW readers:

IN BRAZIL, power is so short that breakdown at Cubatao Plant of "The Light" makes a major headline. The 490,000-kw station has an effective head of 2,358 ft, among world's highest

UNITED NATIONS, N. Y.—All over Latin America, plans and construction are now going forward to close the gap between power production and ever growing demands of expanding industry. But closing the gap presents a number of problems. Thermal plants for an additional million and a half kw capacity were installed in Latin America during the past 15 years. But thermal plants usually require imported fuels which affect efforts to maintain a satisfactory import-export relationship and boost the cost of electricity to the consumer. During this same period, hydroelectric plants accounted for another two million kw increase in capacity. However, hydro plants generally require a greater capital investment. Undeveloped hydro resources are very often, as in Argentina, Brazil and Venezuela, situated far from industrial centers. And, of course, there are always time-consuming problems in organizing a venture as large as a new power plant and in integrating it with the industrial needs of the country.

One characteristic of the Latin American economy is its dependence on water power as the major source of electricity. All the other continents except Asia are predominantly thermal. The amounts generated by hydro installations in Latin America are, however, only slightly larger than those obtained from thermal plants. In Mexico and Venezuela, small quantities of power are produced from natural gas. In oil-producing areas this possibility seems a natural for a quick boost in power potential and an effective use of a natural resource that might otherwise be wasted. (In Colombia and Venezuela, for example, more than 80% of the natural gas tapped in 1952 was flared or otherwise wasted!) El Salvador's experiment with the production of power from steam arising from an active volcano (a natural resource used successfully in Italy) is being closely watched.

Whatever the problems of expanding power potential, progress has been made. The greatest increase in power capacity during the past 15 years was in Brazil which now ranks first in Latin America. In South America the ABC countries have about 78% of the generating capacity. Brazil has 34%, Argentina, 30 and Chile 14. Colombia, Peru, and Venezuela account for about 6% each of the total and Uruguay for about 4%. Of the other South American countries, none has more than 2% of the continent's total capacity.

In Gulf and Caribbean area, over 70% of the installed capacity is in Mexico, which ranks third in Latin America. Cuba and Puerto Rico are also major producers of electricity with 8 and 9% of Gulf-Caribbean capacity respectively.

Country-by-Country Attack

Brazil . . . Brazil is meeting the demand for more power in three ways: greater utilization of capacity; increasing capacity in the highly industrialized Rio de Janeiro-São Paulo region; and developing the hydroelectric resources of unindustrialized areas of the country.

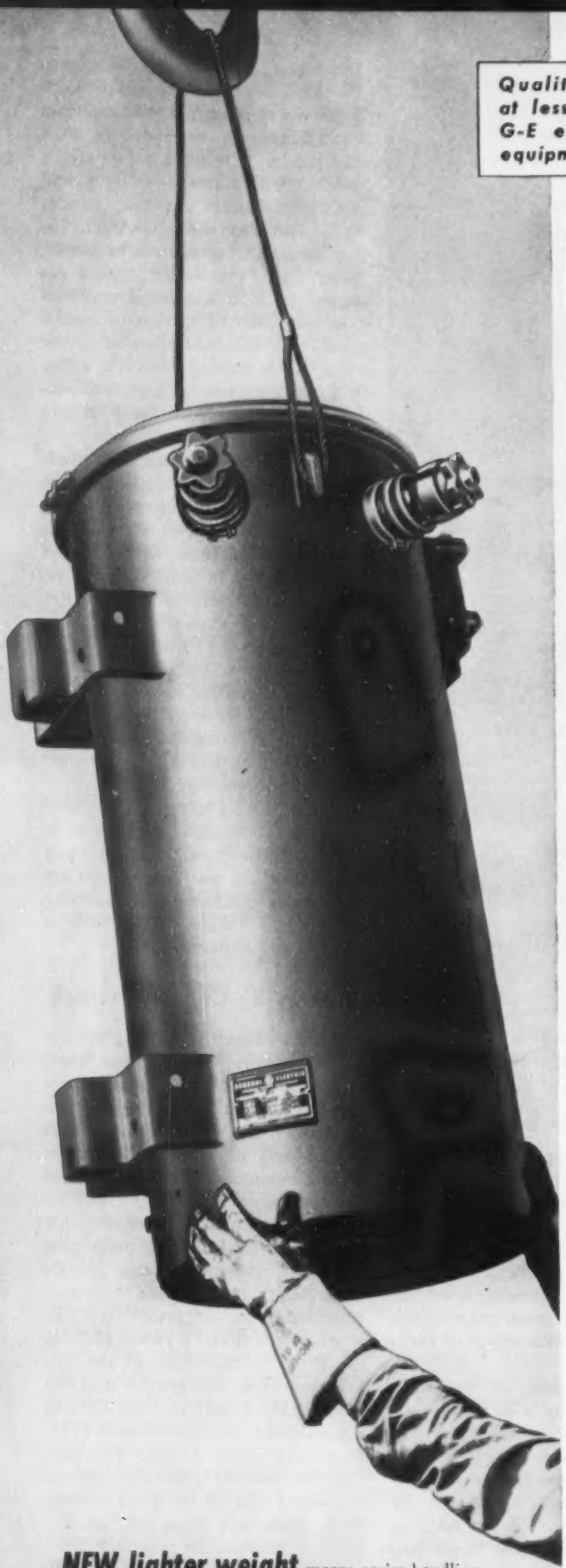
By using the steam power only as a supplement to hydraulic production (especially important during periods of drought) Brazil hopes to lessen dependence on imported fuel. In Northeastern Brazil a power plant at the Paulo Alfonso falls of the Sao Francisco river will provide 120,000 kw in 1954. A third unit (60,000 kw) is scheduled to start operation in 1955. Eventually Paulo Alfonso will generate 900,000 kw. The long range development plan for the Sao Francisco River basin will mean still another

(Continued on page 60)

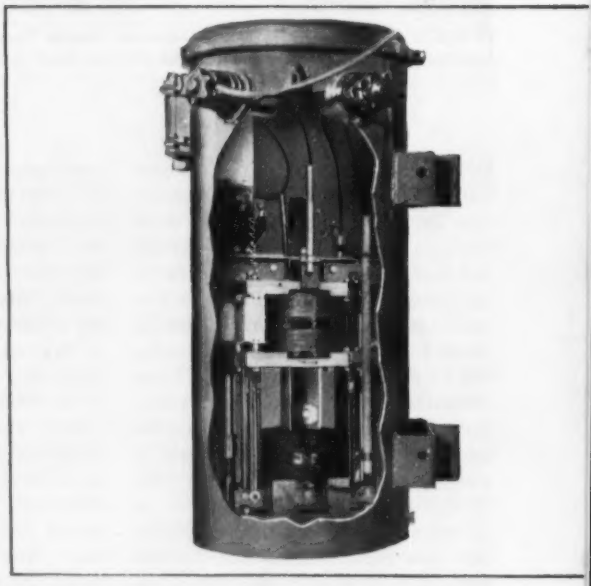
Quality lighting at less cost with G-E engineered equipment.

ALL NEW G-E Constant-current TRANSFORMER for Street-lighting Systems

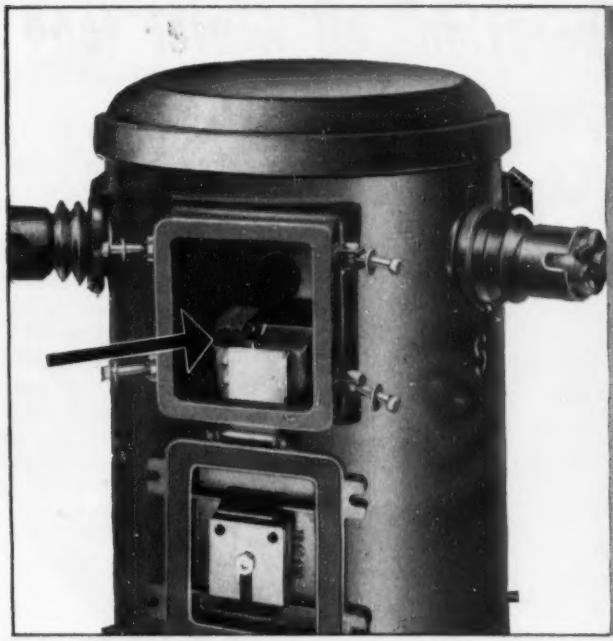
up to 33% lighter



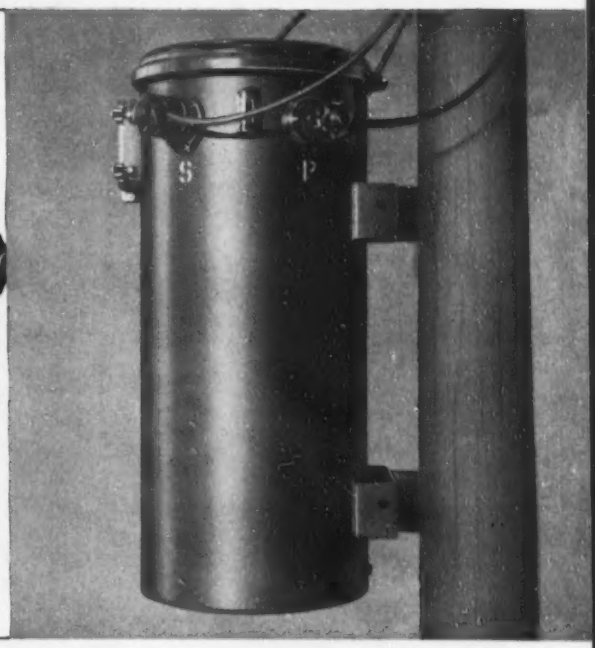
NEW lighter weight means easier handling. RO2 transformer, including oil, is 20% and 33% lighter in the 10-kw and 30-kw sizes respectively.



NEW faster response to load changes from radically new design which eliminates counter balance, introduces parallel straight-line motion, cuts down friction points.

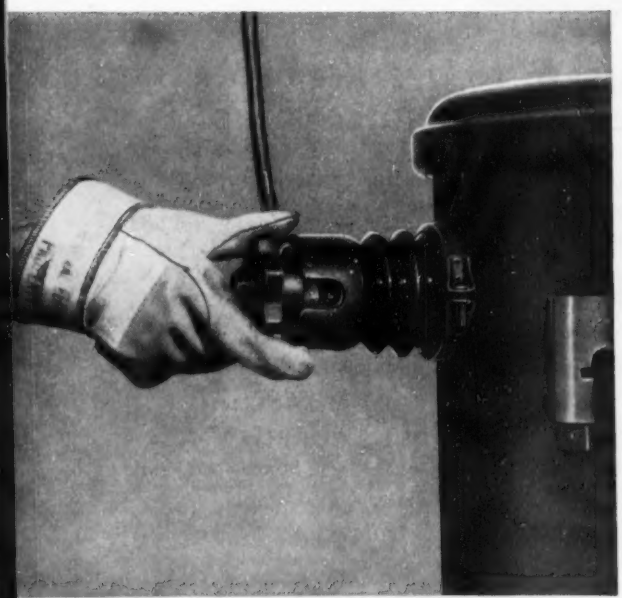


NEW easy adjustment is accomplished from the outside through convenient access door located above the oil level. Transformer cover need not be removed.



NEW easy mounting cuts installation time. Special slotted mounting bracket allows direct-pole mounting of models up to and including the 20-kw size.

. . . and far easier to install and maintain



NEW simplified connections, quickly, without tools, by inserting the cable from either direction into the bushings and tightening the insulated handwheel.

G.E.'s new CC transformer for street lighting represents the most sweeping design advance in the industry in 50 years.

LESS FRICTION—It uses the magnetic suspension principle to completely support its moving coil. Thus, the only points of friction in the entire assembly are the two sleeve ball bearings which direct vertical movement of the moving coil.

LIGHTER WEIGHT—The new CC transformer is lighter and more compact, permitting pole mounting of larger ratings than was possible before. Grain oriented silicon strip steel in the core and aluminum wire in the moving coil conserve space and weight.

GREATER CONVENIENCE—Easy installation and servicing are assured by the simple mounting bracket, the cable bushings with their insulated handwheels. The access door on the side of the tank permits adjustments without removing the cover and reaching below the oil level.

VERSATILE—Designed to supply constant current for series street-lighting circuits, this new G-E CC transformer will operate efficiently with any type of lamp load.

MORE INFORMATION—Is available from your nearest G-E Apparatus Sales Office or authorized G-E street-lighting agent. Or write for Bulletin GEA-5975, Section 452-137, General Electric Company, Schenectady 5, N. Y.

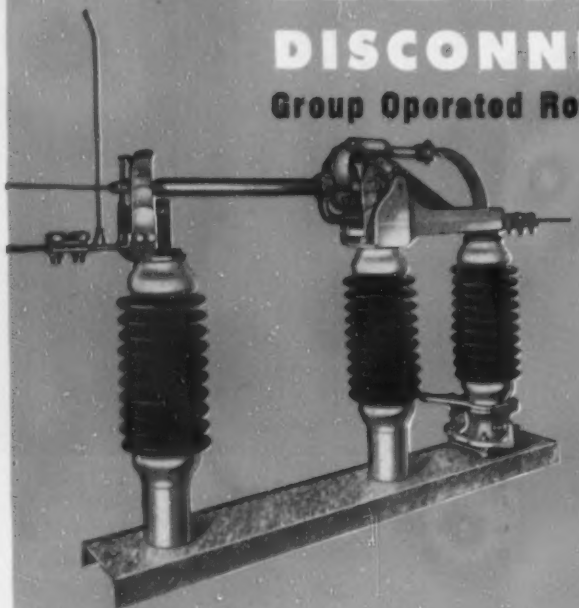
You can put your confidence in—

GENERAL ELECTRIC

Get easy "summer operation" all winter long with KEARNEY

DISCONNECT SWITCHES

Group Operated Rotating Insulator Type



VERTICAL BREAK

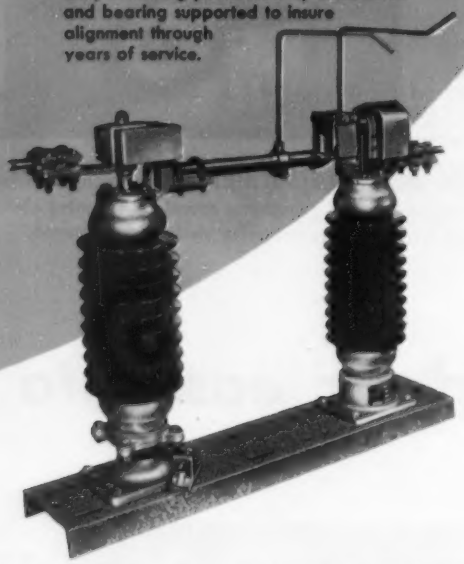
7,500 to 69,000 volts
400 Amps., 7.5 KV to 34.5 KV
600 Amps., 7.5 KV to 69 KV
1200 Amps., 7.5 KV to 69 KV

Only 3 moving parts. Simple, rugged, and completely adjustable for right or left-hand installation.

SIDE BREAK

7,500 to 69,000 volts
400 and 600 amperes

Only 2 moving parts. Heavily constructed and bearing supported to insure alignment through years of service.



Features:

- Positive current transfer from blade to line terminals through weather-protected high pressure contacts.
- Powerful tubular blade of electrolytic hard drawn copper, balanced and aligned.
- Easy adjustment for phase synchronization.
- No flexible shunts.
- Oilite bearings for easy operation.
- Both ends of blade seat in silver overlay contacts. No current transfer through hinge bearings on the rotating switch.
- Weather-sealed blade adjustments on side break switch.
- Ice-breaking, rotating jaw contact controlled by blade movements on side break switch.
- No springs or cams.

For Better Construction — Safer Maintenance

ENGINEERED TO OPERATE UNDER THE TOUGHEST ICING CONDITIONS

When you need them most they're on the job! These trouble-proof switches are ready to operate regardless of weather.

Smooth-operating, cool-running and corrosion-resistant, Kearney Rotating Insulator Switches bring you the utmost in modern disconnect switch performance.

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250

Specify **KEARNEY Products**

MANUFACTURERS AND MARKETS

Sales Records . . .

. . . set during 1953 by General Electric, Westinghouse, and Sylvania firms

Three of the nation's largest electrical manufacturers—General Electric, Westinghouse, and Sylvania—set new net sales records during 1953.

- GE sales reached $3,128,127,000, an increase of 19% over the 1952 total of $2,623,888,000.
- Westinghouse hit $1,582,047,000, a jump of 9% over 1952.
- Sylvania had sales of $293,267,408, an increase of almost 25% over the $235,023,437 in 1952.

GE President Ralph Cordiner further reported that the company's 1953 net earnings of $165,728,000 were 9% higher than the $151,720,000 total for 1952. Earnings equalled $5.75 per share of common stock, compared with $5.26 the preceding year.

Federal taxes, which Cordiner cited as the factor that prevented "the benefits of GE's growth over the last few years from being fully realized in net earnings during 1953," amounted to $308,500,000 or $10.69 a share. This was an increase of 17%.

Similar Progress . . . Westinghouse President Gwilym A. Price said that the company's net income for 1953 was $74,322,000, an increase of 8% over the $68,581,000 in 1952. Earnings per common share were $4.53, up 30 cents over the previous year. The bill for all federal, state, and local taxes totaled $126,094,000, equivalent to $7.89 a share.

Net income for the fourth quarter of 1953 was $21,104,000, equal to $1.29 a common share. This compared with net income of $19,841,000, equal to $1.23 a common share in the last quarter of 1952.

In addition to new sales records in 1953, Sylvania also attained the largest net income in the 52-year history of the company—$9,536,181. This was a gain of 37% over 1952, when income was $6,960,625.

Chairman of the Board Don G. Mitchell and President H. Ward Zimmer reported that income was equal to $3.10 per share of common stock, up six cents over 1952.

For One Year of Faithful Service

Col Robert H. Morse, chairman of the board, Fairbanks, Morse & Co, presented a cup this month to W. B. Wylly, manager of the firm's Atlanta branch, which achieved the best record in the company's 1953 sales contest. Shown, left to right, are: Robert H. Morse, Jr, president; Wylly; Henry J. Barbour, manager, sales promotion and public relations; W. B. Morse, manager, Detroit branch; and Col Morse.

MANUFACTURERS BRIEFS

Line Material Co will complete work next month on a 40,000 sq ft addition to its central plant in South Milwaukee, Wis. Another addition of similar size will be made later this spring at the Kyle Products plant. The additions will cost about $500,000.

General Electric Co plans to build a new multi-million dollar plant in Roanoke, Va. to meet demands for large industrial control equipment. The 450,000-sq ft facility will be in full operation by late 1957 and will produce electrical controls for many industries.

Okonite Co of Passaic, N. J., manufacturer of insulated wires and cables, will merge with Okonite-Callender Cable Co, its wholly owned subsidiary, on April 1. The subsidiary's plant was established in Paterson, N. J., in 1924 as a joint venture of Okonite and British Insulated Callender's Cables Ltd.

MANUFACTURERS' EARNING

Company	Period Months Ended		Net Income 1954	Net Income 1953	Earnings Per Common Share 1954	Earnings Per Common Share 1953
Babcock & Wilcox	12	Dec.	$12,061,389	$9,809,440	$8.14(a)	$6.95(a)
Baldwin-Lima-Hamilton	12	Dec.	7,361,213	7,222,925	1.54	1.51
Fairbanks, Morse	12	Dec	4,262,734	4,602,929	3.55	3.84
Foster Wheeler	12	Dec.	2,877,254	886,304	5.05	1.56
International Harvester	3	Jan.	4,660,000	10,947,000	.24	.72
Minneapolis-Honeywell Regulator	12	Dec.	10,329,825	9,081,003	3.31	3.00
Pittsburgh Coke & Chemical	12	Dec.	2,855,000	2,163,000	2.63(a)	2.12(a)
Radio Corp of America	12	Dec.	35,021,778	32,325,399	2.27	2.10
Wagner Electric	12	Dec.	3,684,074	4,065,690	6.96	7.83
United States Rubber	12	Dec.	32,732,300(b)	28,169,955(c)	5.19	4.33

Notes—(a) Based on shares outstanding at close of respective periods; (b) Includes $1,958,414 restoration of reserves and $3,518,017 tax credit from prior years' accruals no longer required; (c) Included tax credit of $3,965,753 from prior years' accruals no longer required.

MEETINGS CALENDAR

Atomic Industrial Forum, Inc.
Hotel Biltmore, New York, March 15-16.

National Association of Corrosion Engineers
10th Annual Conference and Exhibition, Kansas City, Mo., March 15-19.

***Edison Electric Institute**
Industrial Relations Committee, EEI Headquarters, New York, March 18; 20th Annual Sales Conference, Edgewater Beach Hotel, Chicago, April 5-8; EEI-AGA Accounting Conference, Hotel Statler, Boston, April 12-14; Industrial Relations Committee, Netherlands Plaza Hotel, Cincinnati, Ohio, April 15; Electrical Equipment Committee, and EEI-AEIC Meter and Service Committees, Edgewater Beach Hotel, Chicago, May 3-4; 22nd Annual Convention, Atlantic City, N. J., June 1-4.

Pacific Coast Electrical Association
Engineering and Operating Sections, Mark Hopkins Hotel, San Francisco, March 18-19; Administration Services Section, Hotel Claremont, Berkeley, Calif., April 7-8; Annual Convention, Hotel Del Coronado, Coronado, Calif., May 19-21.

North Central Electrical Industries
17th Annual Electrical Industry Convention, Hotel St. Paul, St. Paul, Minn., March 21-24.

Institute of Radio Engineers
1954 National Convention, Waldorf-Astoria Hotel and Kingsbridge Armory, New York, March 22-25.

***Northwest Public Power Association**
Annual Convention, Winthrop Hotel, Tacoma, Wash., March 31-April 1-2; Engineering and Operations Section, Benjamin Franklin Hotel, Seattle, Wash., May 20-21.

American Institute of Electrical Engineers
6th Conference of Subcommittee on Rubber-Plastics Industries of Committee on General Industry Applications, Mayflower Hotel, Akron, Ohio, April 5-6; Conference on Feedback Control, Claridge Hotel, Atlantic City, N. J., April 22-23; Northeastern District Meeting, Hotel Van Curler, Schenectady, N. Y., May 5-7; Conference on Telemetering, Morrison Hotel, Chicago, May 24-26; Summer General and Pacific General Meeting, Hotel Biltmore, Los Angeles, June 21-25; Fall General Meeting, Chicago, Ill., Oct. 11-15.

***Indiana Electric Association**
14th Annual Young Men's Utility Conference, Gary Hotel, Gary, Ind., April 5-6.

Illuminating Engineering Society
Southern Regional Conference, Roosevelt Hotel, New Orleans, La., April 8-9; Southwestern Regional Conference, Rice Hotel, Houston, Tex., April 11-14; Inter-Mountain Regional Conference, Denver, Colo., April 15-16; South Pacific Coast Regional Meeting, Museum of Art, San Francisco, April 19-20; Pacific Northwest Regional Meeting, Benjamin Franklin Hotel, Seattle, Wash., April 22-23; Canadian Regional Meeting, King Edward Hotel, Toronto, Ont., April 28-30; Great Lakes Regional Meeting, Sheraton Cadillac Hotel, Detroit, May 3-4; Midwestern Regional Meeting, Hotel Jefferson, St. Louis, June 17-19; National Technical Conference, Chalfonte-Haddon Hall, Atlantic City, N. J., Sept. 12-16.

***Maryland Utilities Association**
Spring Conference, Lord Baltimore Hotel, Baltimore, April 23.

***Pennsylvania Electric Association**
Systems Operation Committee, Bedford Springs Hotel, Bedford Springs, Pa., May 6-7; Prime Movers Committee, Castleton Hotel, New Castleton, Pa., May 17-18.

***New Jersey Utilities Association**
Spring Meeting, Seaview Country Club, Absecon, N. J., May 12-13.

*Addition this week.

Latin America

(Continued from page 53)

million kw. Already, Rio and São Paulo companies are establishing branches near the new hydroelectric plant. This program should provide a healthy decentralization of future industrial expansion.

Argentina . . . Recent plans for developments of power in Argentina show signs that there is a trend away from the predominant dependence on steam-produced power. Today, 95% of all Argentine power is produced by thermal plants, but of the plants under construction, hydro power makes up about half of the increased capacity (830,000 kw). Ultimately, Argentina plans to develop 1.4 million kw hydraulically. In addition, the possibility of cooperating with Uruguay in the development of another 700,000 kw capacity on the Salto Grande is also being considered.

Chile . . . Severe power shortages during winter months in heavily industralized Santiago have brought about attempts to encourage the relocation of industry in areas nearer to hydroelectric resources. With many mountain rivers crossing its narrow land, Chile has a very high hydroelectric potential. The country also has natural fuel resources and about half of all power is now produced in thermal plants.

Empresa Nacional de Electricidad S. A. (ENDESA), the national power agency, plans to increase capacity of public power to a million kw by 1960 by the construction of hydro plants throughout the country. Six of these power plants have been completed.

Colombia . . . Colombia is humming with power developments. Although there is still an unsatisfied demand for power, increases in capacity have kept pace with increased production. It now looks as if Colombia will reach its goal of 475,000 kw capacity in 1955.

An interesting feature of Columbia's program for more power is a separate plan providing for the installation of Diesel generators in small towns and villages. Several of these generators are already in operation.

Peru . . . Surprisingly, the proportion of power produced hydraulically went down from 75% in 1937 to 64% in 1952. However, the long term trend will be toward use of waterpower.

Venezuela . . . Venezuela, with an abundance of petroleum, produces 72% of its power with thermal installations. With potential five times greater than in 1937, capacity continues to increase rapidly. Discovery of large iron deposits has expedited plans to harness the Rio Caroni. 50,000 kw will be available there in 1955 and 200,000 kw more at a later date. Another 198,000 kw will be available for expanding industry elsewhere by 1955.

Mexico . . . Mexico, another country with petroleum resources, now produces 49% of all power with thermal plants as compared to 41% in 1937. Although Mexico is just now completing a program to increase capacity by 857,000 kw, total production is still considerably below demands. A plan to install 500,000 kw more (60% thermal) is now being prepared.

Cuba . . . Cuba plans to increase capacity by 140,000 kw by 1957. If these plans are carried out, they will come close to doubling 1952 capacity.

Central America . . . In other Central American countries, Costa Rica, El Salvador, Nicaragua and Guatemala, assisted by the Technical Assistance Administration of the United Nations, are surveying the electric resources of the region as a whole. The biggest news in Central America is El Salvador's harnessing of the Rio Lempa (EW, April 27, 1953, p 22). The project, called "Guayabo," will be underground and will have an initial capacity of 33,334 kva. J.M.N.

Conclusion?

The conclusion, if you can call it that, is that many Latin American countries are working hard to develop their power resources. But the resources are not overly plentiful, especially those used in thermal production. And money is even less so. Nevertheless, a new UN survey on world electricity shows power production has expanded more rapidly in Latin America in recent years than in most other regions of the globe. The problem is recognized and is being faced up to by most Latin Americans. And that in itself augers well for a better time to come.

Save as much as 14% of initial cost with G-E 7-strand station control cable

General Electric recommends the use of No. 10 Awg 7-strand and No. 12 Awg 7-strand conductors for station control cable . . . based on coordinated studies by G-E wire and cable, instrument, meter, and relay engineers. This cable can save as much as 14% in your initial control cable cost when you compare the No. 10 Awg 7-strand size to cable composed of 19 strands of No. 22 Awg wire.

G-E 7-strand control cable effectively meets today's requirements for control cable flexibility. The 7-strand construction is easier to use with pressure-type terminals than are the older 19-strand types. There is no sacrifice in reliability.

In addition to the important feature of lower cost, the 7-strand control cable promotes standardization by conforming to standard Awg wire sizes—an important consideration when speedy delivery is a major factor.

For more information about 7-strand station control cable see your G-E wire and cable specialist. Or, write to Section W73-327, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC

New Mexico PSC Grants . . .

. . . an annual rate increase of $312,000 to Public Service Co of New Mexico on its electric operations

In a lengthy 182 page order, the New Mexico Public Service Commission granted a $312,000 annual rate increase on the electric operations of the Public Service Co of New Mexico.

As to the rate of return, the company's exhibits indicated that on present rates the rate of return amounted to "4.97% on the combined Albuquerque-Las Vegas-Santa Fe Division, 5.98% on the Deming Division, and 5.03% on total electric; 4.48% on Las Vegas water, 4.11% on Santa Fe water, and 4.19% on combined water, with total company rate of return of 4.93%." The company's contention was that it should be permitted to earn 6.85% on the rate base.

It is of interest to note that the company considers the Deming electric operation separate and apart from the integrated Albuquerque-Las Vegas-Santa Fe divisions and made no claims for increasing rates in Deming.

Adjusted Rate of Return . . . The PSC, in its determination of the adjusted rate of return for the integrated electric divisions of the company, came to the conclusion that this amounted to 5.766%.

As to the rate base itself, the commission in arriving at working capital allowed one-eighth operating expenses (ex purchased power) plus materials and supplies and made no deductions or other adjustments with respect to federal income tax accruals on the books of the company.

With respect to construction work in progress, the PSC stated that ". . . it is not at all uncommon, for the accounts to reflect a heavy balance in the Construction Work in Progress Account when the construction work has long been completed and the project has been placed in service. The inclusion or exclusion of Construction Work in Progress balances as part of a rate base, as of any given date, therefore must be resolved in the light of actual conditions and not by mere accounting classifications. Such construction work in progress, is entitled to be considered as total Plant in Service, on which the utility is entitled to earn a return if it is actually used or useful in serving the public."

The PSC said that it ". . . has eliminated from such service plant any balances on projects which will not be placed into service by the end of December, 1953. The impact of these projects upon the company revenues and expenses has been considered by the commission in determining the adequacy or nonadequacy of present service rates."

Elimination of Interest . . . The commission also noted and agreed with the company that interest charged to construction be eliminated ". . . for all projects carried in the Construction Work in Progress Account, asked to be included in the rate base."

As to the determination of value in arriving at the company's rate base ". . . the commission is required, under the provisions of the Public Utility Act of New Mexico (Section 26) to give due consideration to the history and development of the property and business of the particular utility, to the original cost thereof, and to the cost of reproduction as a going concern, and to other elements of value recognized by the laws of the land for rate making purposes."

The PSC order continued: "In the past the commission has followed a policy of allowing a 5% reproduction cost factor, based upon the book balances of original cost of Plant in Service (Account 100.1) as of a date of one year previous to the determination of the rate base, less the amounts recorded for Contributions in Aid of Construction, in recognition of this requirement of the Public Utility Act. This 5% reproduction cost allowance is thus computed on Plant in Service as reflected by the recorded book entries to the proper accounts and is not given on balances reflected in the Construction Work in Progress Account (100.3)."

PSC added, significantly, that "No evidence was offered in this cause by the utility as to any other cost of the utility's plant other than the recorded original cost, and in its Exhibit 8-A, the utility claimed a reproduction cost allowance in the amount of 5%."

In its findings, the commission stated that while the Deming electric operation was currently only earning 5.77% upon the rate base, it would appear that it is ". . . presently sufficient, under all the facts and circumstances in this case to enable petitioner to meet its allowable expenses, its capital costs, and interest requirements, attributable to its Deming operations, and to provide sufficient earnings upon its equity capital attributable to its Deming operations, to enable the petitioner to provide a reasonable return to its investors and to attract capital."

Temporary Condition . . . The PSC stated, however, that this condition was temporary and that ". . . what the commission believes represents less than a fair rate of return upon its investment in such operations may result in electric service rates which could discriminate unfairly in connection with other electric customers of the petitioner; that the continuance of any situation wherein less than a fair return, could, overall, work to the deteriment of other consumers in connection with petitioner's overall operations."

As to the company's integrated electric operations, the commission found that the indicated rate of return of 5.76% to be inadequate and that ". . . it is proper for petitioner to earn an indicated rate of return of 6.3%."

The PSC went on to say "That the petitioner in this proceeding sought increased service rates for its electric operations within the integrated system which would produce additional gross operating revenues from such integrated operations in the amount of $968,500.

"That the excess in gross operating revenues sought to be effected by the petitioner in this cause by which the total of $968,500 exceeds the amount of $312,000 should be disallowed."

As to company's water operations, PSC considered the current return of 4.7% inadequate and ordered rate increases to produce earnings equivalent to 6% on the rate base.

FINANCIAL

Gets Permanent Rate Boost

WWP receives Washington Public Service Commission approval to leave its temporary $748,800 increase in effect

Washington Public Service Commission has issued a permanent order in place of a temporary one to increase rates $748,800 a year for Washington Water Power Co. The PSC found that a rate of return of 5.85% on the company's property in the State of Washington was fair and reasonable.

The commission in its order stated: "The application of the pro forma method of viewing results of operations and rate of return . . . gives effect to the restatement of actual experienced results of operations for those influences which were considered and set out in the initial order in this cause. These influences are primarily: (1) An adjustment to portray the total of the Cabinet Gorge project as completely operative throughout the test period; (2) an adjustment to reflect the revenues and power purchase costs which would have arisen within the company's operations had hydro conditions stood at median throughout the test period; (3) an adjustment to give effect to the current level of wage costs throughout the test period; and (4) an adjustment to give effect to the current level of rates throughout the test period."

WWP, PSC Staff Agree . . . As to the company's operations, PSC stated that "For the 12-month period ended Sept. 30, 1953, the results as presented by both the company and staff are substantially in agreement. The differences which exist are due to opposing views as to the allocation of certain costs assigned in part to State of Washington electric, which are identifiable for the total system operations in Washington and Idaho. These costs are the amortization of utility plant acquisition adjustment and certain administrative and general costs, each of which is accounted for at the total system level only, but apply to the components of the company's total operations. Because of this general overall applicability allocations between Washington and Idaho on some equitable basis are necessary. Any allocation cannot represent 100% refinement.

"However, this contrast in the application of allocation methods is responsible for the differing rates of return for the 12-month period ended Sept. 30, 1953, for State of Washington electric, on a pro forma basis, which is measured by the company to be 5.87%. The staff of the commission measures the rate of return for the same period to be 5.92%. Both the company and staff presentation makes use of a ratio for the separation of the investment in and operating costs of the major power system to states which is based upon energy requirements at substations.

"For the year ended Sept. 30, 1953, this ratio was determined to be 60% for the State of Washington electric, and 40% for the State of Idaho electric. The company contends that the major power system ratio based upon energy requirements alone used for the presentation of operating results separately for the States of Washington and Idaho gives undue weight to the usage of energy, to the entire exclusion of individual state requirements for peak demands."

The commission continued: "In considering the cost of supplying electric service it is important to consider not only the energy but the demand component associated with the power

$120 Million Suit Filed in Iowa

Ten electric companies in Iowa, Missouri, and Wisconsin were named defendants in a $120 million damage suit filed in U. S. District Court in Davenport, Iowa, by the First Iowa Hydro-Electric Co-operative, Muscatine, Iowa.

The co-op, which planned construction of a dam on the Cedar River in Iowa, near Muscatine, asserts the Iowa Utilities Association, composed of the major electric producers serving Iowa, made deliberate attempts to prevent issuance of a license for construction of the dam known as Federal Power Commission Project No. 1,853.

$40 Million in Damages . . . The co-op claims it has been damaged to the extent of $40 million and asks treble damages of $120 million. Members of the plaintiff firm are Harry Imel, P. H. Naber, Carl J. Mitzner and F. A. E. Gilmore, all listed as equal holders.

The suit charges that in order to prevent marketing of securities of the co-operative, banks and financial institutions were "threatened" with boycott and loss of utility business on a national scale.

The complaint also alleges a 1948 agreement of the defendant companies recited their unalterable opposition to the proposed Cedar River project and proposed pooling of resources to combat the proposed project. The complaint also says the defendants agreed among themselves not to use any of the power that might be generated if the project should be completed.

Monopoly Cited . . . The complaint asserts the named utilities conspired "to monopolize, monopolized, and attempted to monopolize the general transmission, distribution and sale of electric light and power in the area of Iowa, Wisconsin, Illinois and Missouri." It further asserts the companies have control of approximately 90% of the electric power distributed in the area.

The suit further charges restraint of interstate trade and asks the court to enjoin the firms from "all activities designed to prevent new competitors from entering electric power field."

Named as defendants were:

Iowa-Illinois Gas & Electric Co; Iowa Power & Light Co; Iowa Southern Utilities Co; Interstate Power Co; Union Electric Co; Kansas City Power & Light Co; Iowa Electric Light & Power Co; Northwest Light & Power Co; Wisconsin Power & Light Co; and Iowa Public Service Co.

requirement and the resulting load factor. The company has a substantially larger number of residential customers in this state with a comparatively high demand but low load factor in contrast to Idaho where there is a relatively higher industrial load. The latter load with constant energy requirements and high load factor has a comparatively low demand requirement at the time of the company's maximum peak demand."

Amplifies Position . . . The commission further amplified its position by stating that: "The commission, however, of its own knowledge realizes that the use of energy requirements alone at this time tends to keep the apportionment ratio at an artificial level. In view of the large variation in rate of return between total company electric operations of 5.66% for the year ended Sept. 30, 1953, and that presented by the commission staff for the same period for State of Washington electric operations of 5.92%, the energy requirements ratio employed in part for the intrastate separation is not the most equitable ratio for allocation between states due to the failure to consider demand requirements.

"The commission concluded that if such a combined separation ratio were employed, the return for the State of Washington electric, on a pro forma basis, for the year ended Sept. 30, 1953, would be measured at or below 5.85%."

The commission concluded that ". . . equitable ratio to be employed for purposes of intrastate separation of total system power production and transmission facilities should incorporate some weight for demand requirements when the latter are at odds with energy requirements alone."

Depreciation . . . The commission also gave consideration to depreciation accounting when it said: "The company currently follows the retirement appropriation method of depreciation accounting, which in effect makes appropriation from a current year's operations of an amount of retirement expense estimated as covering the cost of future retirements which will need be made as a result of the current year's operations."

The PSC in ordering the company to proceed with a study of depreciation accounting said: "Revision of the company's depreciation practices must receive prompt consideration, but more current information than that presently entered in this record is necessary for final determination."

Finally, the commission found that ". . . respondent's Washington electric operations, viewed on a pro forma basis, are at the approximate level contemplated in our initial order granting a temporary rate increase and accordingly no adjustment to the rates therein authorized is required."

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1954									
Mar. 4	**2.83**	**2.86**	**3.15**	**3.92**	**4.08**	**4.43**	**4.83**	**5.26**	**5.38**
Feb. 25	2.85	2.90	3.17	3.94	4.11	4.49	4.87	5.29	5.39
END OF QTR.									
4th 1953	3.07	3.12	3.34	4.17	4.32	4.62	5.07	5.57	5.51
3rd 1953	3.30	3.33	3.54	4.35	4.52	4.83	5.36	5.97	6.01
2nd 1953	3.34	3.46	3.64	4.47	4.70	4.88	5.52	5.93	6.10
1st 1953	3.15	3.23	3.39	4.16	4.41	4.66	4.95	5.24	5.50

Data: Reis & Chandler, Inc.

EARNINGS

Company	Period Months	Ended	Net Income 1954	Net Income 1953	Earnings Per Common Share 1954	Earnings Per Common Share 1953
California-Pacific Utilities	12	Jan.	$601,838	$544,100	$2.12(a)	$2.04(a)
Consumers Power	12	Jan.	25,206,069	19,806,283	2.92(b)	2.66(b)
Kansas City Power & Light	12	Jan.	6,525,341	6,073,605	2.19(c)	2.21(c)
Ohio Edison	12	Jan.	19,460,524	16,477,258	2.88(f)	2.74(f)
Oklahoma Gas & Electric	12	Jan.	5,938,371	5,744,698	1.87(g)	2.03(g)
Virginia Electric & Power	12	Jan.	13,082,527	11,837,658	1.80(h)	1.76(h)
			1953	**1952**	**1953**	**1952**
Boston Edison	12	Dec.	$8,024,448	$8,146,871	$3.10(i)	$3.30(i)
Cincinnati Gas & Electric	12	Dec.	11,238,454	10,057,798	1.56(j)	1.40(j)
Dayton Power & Light	12	Dec.	7,758,715	8,275,442	2.63	2.85
Wisconsin Public Service	12	Dec.	4,181,000	3,668,000	1.54	1.36

Notes—(a) Based on 299,180 shares in 1954 and 225,766 shares in 1953; (b) Based on 7,473,798 shares in 1954 and 6,176,693 shares in 1953; (c) Based on 2,450,000 shares in 1954 and 2,224,540 shares in 1953; (f) Based on 5,806,136 shares in 1954 and 5,278,306 shares in 1953; (g) Based on 2,653,140 shares in 1954 and 2,411,945 shares in 1953; (h) Based on 5,999,980 shares in 1954 and 5,441,034 shares in 1953; (i) Based on 2,592,089 shares in 1953 and 2,468,656 shares in 1952; (j) Based on 6,505,000 shares in 1953 and 6,405,000 shares in 1952.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF MARCH 4–10			
Bonds			
Omaha Public Power District—electric revenues due 1956–84	$12,000	various	0.9-2.50%
California Oregon Power—1st mtg 3¼% due 1984	10,000	102.9159%	3.10
SCHEDULE FOR MARCH—APRIL			
Bonds			**Bid Date**
Alabama Power—1st mtg due 1984	$17,000	.....	Mar. 16
El Paso Electric—1st mtg due 1984	5,000	.....	Mar. 16
Pennsylvania Electric—1st mtg due 1984	12,000	.....	Mar. 17
Detroit Edison—1st mtg due 1984	40,000	.....	Mar. 23
Pacific Power & Light—1st mtg due 1984	8,000	.....	Mar. 29
San Diego Gas & Electric—1st mtg due 1984	17,000	.....	Mar. 30
Georgia Power—1st mtg due 1984	11,000	.....	April 6
Community Public Service—1st mtg due 1984	3,000	.....	April 6
Central Power & Light—1st mtg due 1984	18,000	.....	April 12
Southern Indiana Gas & Electric—1st mtg due 1984	8,000	.....	April 13
Ohio Power—1st mtg	20,000	.....	April 14
West Penn Power—1st mtg due 1984	12,000	.....	April 20
Preferred Stocks			
El Paso Electric—15,000 sh no par	$1,500	.....	Mar. 16
Louisiana Power & Light—70,000 sh $100 par	7,000	.....	Mar. 23
Dallas Power & Light—70,000 sh no par	7,000	.....	Mar. 24
Northern States Power (Minn.)—150,000 sh $100 par	15,000	.....	April 14
Ohio Power—50,000 sh $100 par	5,000	.....	April 14
Common Stocks			
Wisconsin Public Service—316,867 sh (to be offered commonholders on 1-for-7 basis, record Mar. 12 to expire Mar. 30; employees will get right to subscribe up to 10,000 shares of unsubscribed shares)	.....	.....	.....(a)
Utah Power & Light—200,000 sh	.....	.....	Mar. 23
Southern Indiana Gas & Electric—114,166 sh (to be offered commonholders on a 1-for-7 basis, record Mar. 24)	.....	.....	.....(b)
Pennsylvania Power & Light—about 705,000 shares (to be offered commonholders on a 1-for-7 basis, record about April 1)	.....	.....	.....
Texas Utilities—250,000 sh	.....	.....	April 13

Notes—(a) First Boston Corp—Merrill Lynch, Pierce, Fenner & Beane—Robert W. Baird & Co.—William Blair & Co., underwriters; and (b) Smith, Barney & Co., underwriters.

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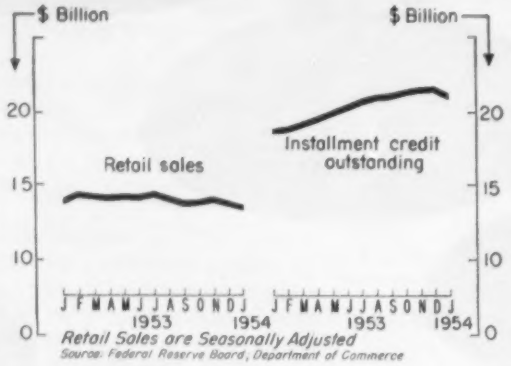
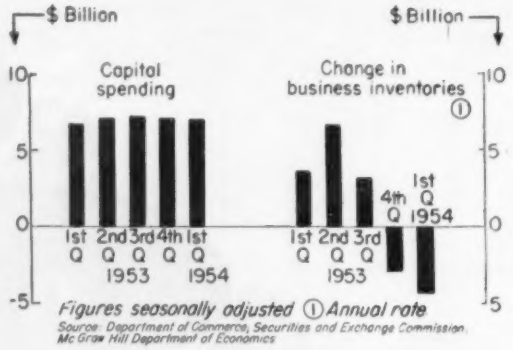
ELECTRICAL BUSINESS OUTLOOK



Some key consumer . . .



. . . and business statistics

March and April: 60-Day Economy Trial

March and April will be key months in the economic record for 1954. They will be months when decisions are made that basically affect the course of the economy. They will also be months full of significant economic news. In view of the current "recession" or "adjustment" (pick your own term) in the economy these decisions and news items will be especially important. Here are some things to watch for in the next month or two:

From the Consumer . . . Consumers will play a key part in making the pattern of business in 1954. Many economists count on strong consumer buying to counteract the effects of cuts in spending by government and business.

The big news item about consumers will be the results of the Federal Reserve Board's Survey of Consumer Finances. This survey, made for the FRB by the Survey Research Center at the University of Michigan, shows the financial condition of the consumer and his buying intentions for the year. It's been highly successful in indicating the course of spending in the past. Results are expected shortly.

In addition, three key figures about consumer spending are published each month by the Federal Reserve Board. One is personal income—which has been declining. Another is consumer borrowing—which declined for the first time in 22 months in January. The last is retail sales —which has also declined. A marked upturn in these indicators could be the signal for the end of the current downward slide in business activity. But, as long as they keep declining, the chances are good that the recession (or adjustment) will continue.

From Business . . . The course of business spending—in two forms—is also of major importance in the 1954 business outlook. One form is business spending for inventories. The other is business spending for new plants and equipment.

Inventory changes play a big part in the current decline in business activity. Industry built up its inventories rapidly after the big steel strike in 1952. Last fall, the inventories turned out to be too big for the volume of business being transacted. So business started cutting, lopped about $1 billion off inventories in late 1953. More cuts are needed—probably $3 billion or more—before inventories get back to proper size. Business capital spending is even more important, in the long run, than changes in inventories. As long as it stays near last year's high level, it's not likely that any decline can reach dangerous proportions.

The Department of Commerce will be out about the end of this month with the results of the annual survey of capital spending plans it makes with the Federal Trade Commission. And, in April, the McGraw-Hill Department of Economics will have the results of its annual survey of Business Plans for New Plants and Equipment.

Three key decisions will also be made in Washington, possibly by the end of April. These are:

- Decision as to whether the economy is heading for a worse recession, or pulling out. The President says that March business statistics will answer most of this question.

- If business is still slipping after another month or two, what should be done about it? The Administration could decide not to cut government spending as rapidly as originally planned (about $5 billion this year), or it can urge Congress to pass tax cuts to stimulate private buying.

- Congress already has its problems about taxes: Where to cut, and how much? Congress' decisions will have a major bearing on the course of business both this year and in the future. And some of its decisions will probably be made in March and April—whether there are further recommendations from the President or not.

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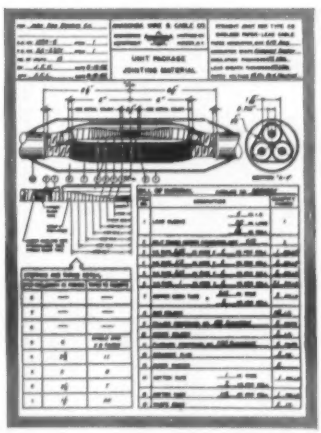

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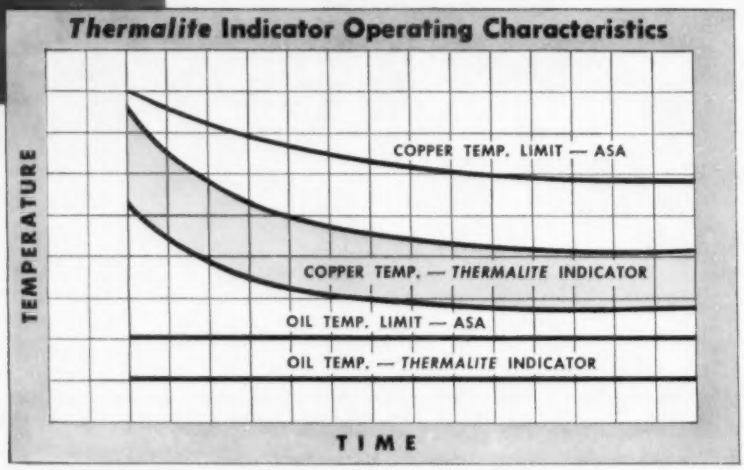

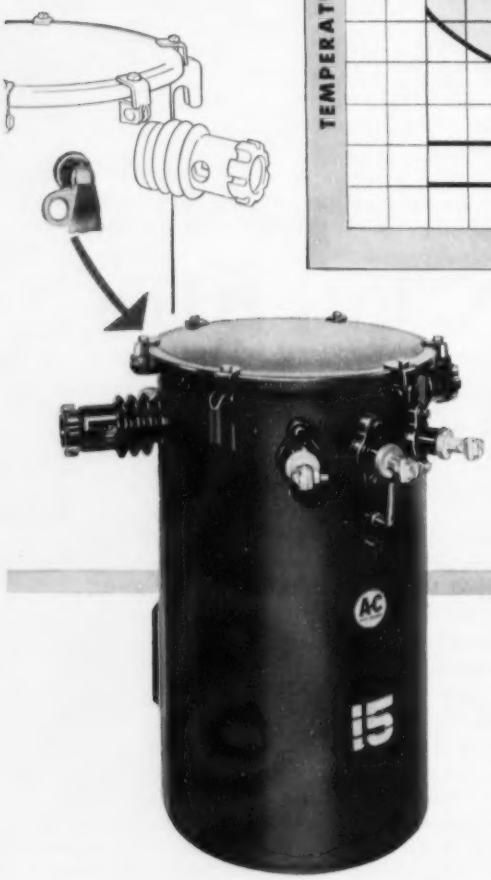

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